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Space Nutrition[1]

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A CHALLENGING nutritional problem faces us when we consider man's conquest of space and man's plan to travel in space—destination Moon, Mars, or a space station.

To many, this thought is fantastic and utterly unrealistic. They are like those who, in the first two decades of the twentieth century, could not conceive of man being flown across the skies. They could not imagine sitting in comfort many thousands of feet above the earth, dining in luxury while being transported at a speed of hundreds of miles an hour from one part of the country to another or from one continent to another. Today, we take such transportation facilities for granted. Indeed, we think of travel time not in days but hours.

We must now broaden our horizons and think of travel in space. Today, it is safe to say that the basic technical knowledge necessary for space conquest is as available as was, in 1910, the basic knowledge needed to develop aircraft as we know it today. In the ensuing years, man as a sky traveler has found ways to protect himself against a foreign environment by pressurizing cabins, by carrying his own oxygen supply, and by heating or cooling the aircraft. Food and water accompany him on his journey across the skies. The aircraft traveller at 5 mi. above the earth's surface flies in comfort during his journey. He lives normally—eating, drinking, thinking, and reading. Can man travel in space? The answer is "yes"; space flight is a fact, but space travel presents many as yet unsolved problems.

What about Space?

What is space? Space begins 120 mi. above Earth. We, who live on Earth, live in a cocoon of atmosphere composed of oxygen and water. Atmosphere, besides supplying us with water and air, acts as a filter against cosmic factors, shields us from meteors, and supplies mechanical support for aircraft. The airless vacuum above this cocoon is space. There, air friction, gravitation, and oxygen become negative entities. Such is space!

Where will men go in space—to the moon, 240,000 mi. away; to Venus, the nearest planet to Earth which is one hundred times farther away than the moon; to Mars; or to a space station built by man to act both as a way station on the path to the moon or a planet and as an observation point?

How long will it take man to travel to these places? Where will he build a space station? How long can he stay out in space? Why does he want to go?

Let us take the last first. Man has always wanted to explore new horizons. Remember Columbus! The scientist wants to make detailed observations of space phenomena, to chart the heavens unhindered by atmosphere, to chart cloud formations for accurate weather forecasts on Earth.

Why should there be a space station? A space station established 1000 mi. above Earth would not only act as a way-station for ferrying supplies and personnel to other areas in space—such as to our nearest neighbor, Moon, but would also enable man to view every corner of Earth's surface. A space station established 1000 mi. out would circle Earth once every 2 hr. or twelve times a day. The earth rotates on its axis making one spin a day. With these two factors operating, every part of Earth would be visible to the observer on the space station once every 24 hr. Open skies could mean no more Pearl Harbors.

How long will it take to get to these places in space? The time will depend on the speed of travel. We know that for an object to be freed from gravity and enter space, the velocity of the object must be 25,000 mi. per hour. This is called "escape velocity." Since straight acceleration to produce this speed is beyond man's endurance, a multiple-stage rocket will probably be used. Already, one can say that the engineering problems of space travel are more nearly solved than are the medical and nutritional problems.

Although the escape velocity must be at least 25,000 mi. per hour, it will certainly be less than the speed of light which is 700 million mi. per hour. Because speed is the unknown factor and because of the possibility that man will want to reside for periods

[1]Presented before the Michigan Dietetic Association in Kalamazoo, on November 4, 1958.

Official U.S. Air Force Photo, released by Dept. of Defense

Tube-type feeding for space flight being tested at the Aero Medical Laboratory, Wright-Patterson Air Force Base, Ohio.

of time on Moon or on a space station, we must talk of time periods of varying length. Each time interval poses a different problem in food and nutrition as we shall see later.

The Sealed Cabin

The traveller will be in a sealed cabin. A sealed cabin is essential because the low air density of space precludes compression of the rarefied air. Compression of this air would create temperatures beyond human endurance—400°F. Ozone and other irritating chemicals in space should not be drawn into the living area. In short, the conventional pressurized cabin of aircraft will not be satisfactory. The space ship must be sealed and pressurized from within.

Remember we speak of a sealed cabin. This raises the problem of oxygen supply and the problem of ridding the cabin of the human wastes of metabolism—such as the noxious gas, carbon dioxide, and the solid fecal and fluid urinary material.

Problem of Eating

The very nature of the trip into space invokes nutritional problems. Let us assume that technology has solved the human compatibility problems of acceleration, of temperature control of a sealed cabin, and of protection against cosmic rays penetrating the cabin of the space vehicle. One problem is the possibility that the traveller will be in a gravity-less environment with objects moving or floating about inside the ship unless they are secured. Weightlessness comes when the space vehicle stops accelerating or decelerating and coasts through space.

Consider the problem of eating and drinking this poses. Ingestion of food in itself would not be a serious problem, because food and beverages, once placed in the mouth, can be kept there by closing the lips. The tongue can be trained to guide the mass to the esophagus. But what of the pre-ingestion problem? Solid foods themselves would have to be kept in containers either in small enough pieces to be suspended in liquids and delivered directly to the mouth by a tube; or in a solid form which could be held in the individual's hand, as a sandwich is held.

Pre-ingestion truly presents a problem under conditions of weightlessness. When one considers assembling a traditional meal on a plate under conditions of weightlessness, the aspect is awesome. Imagine opening a package of corn flakes and envision each little corn flake suspended between container and bowl, assuming, of course, that the bowl is fastened to something and is not also floating. Can one even predict how milk poured in a container will act? Will it pour or fall as a lump, or remain glued to the container?

Consider another meal—lunch. Perhaps a sandwich is the answer, since the filling would be contained between bread and shepherded to the mouth by hand. At any rate, in this situation of weightlessness, meals would certainly not be of the type to which we are accustomed.

The Alternative Answers

Does the answer to nutrition rest in especially concocted food mixtures of the slurry type with all ingredients essential for the normal diet of man incorporated and blended to a semi-liquid consistency? If so, eating would then be a matter of piping the semi-liquid meals to the traveler's mouth or filling up individual containers labeled breakfast, lunch, dinner. Another alternative is, of course, reverting to pills containing all the known nutrients.

I think you will all agree that these alternatives leave much to be desired—monotony in the former instance certainly; in the latter, monotony plus many other factors, including the psychologic and physiologic.

Weightlessness and lack of gravitation then present profound nutritional problems, if the journey in space is made under the gravity-less conditions described here. Let us hope that the engineers and scientists will cross another frontier of exploration and solve this awesome problem by inventing some sort of "synthetic" gravity which can be established in the space vehicle.

Time frames in flight durations were mentioned

above. Since the length of the journey depends on the speed of the trip and since man will want to spend time on the space station, Moon, or a planet, planning must include consideration of the feeding problems involved in a short journey, an intermediate journey, and an extended stay.

Before we consider the nutritional problems these time frames present, we should consider some of the conditions likely to be encountered in a trip into space.

Building a Space Station

Wernher von Braun, as far back as 1953, stated that there was nothing mysterious about using the rocket principle as the first step toward making a space station a reality. This would involve, he says, a huge three-stage rocket capable of carrying a crew and 30 or 40 tons of cargo into the 2-hr. orbit, which is 1075 mi. above Earth. The passengers and crew would be located in the nose of the third stage rocket ship with the cargo compartment directly behind. The first and second stages would be dropped when their tasks were completed. The third stage, with cabin and cargo area, has its own rocket motors which are needed for space exploration and to return to Earth.

This flight to the 2-hr. orbit some 1,000 mi. out, as Dr. von Braun writes of it, will take but 56 min. At the designated point, the doors are opened and the crew is ready to erect a space station. They begin to unload the tons of equipment by pushing it out of the ship. The cargo and crew, like the space ship, are now satellites. The crew, dressed in their pressurized space suits complete with oxygen and a propellant, are not aware that they are in orbit moving at a rate of 66,000 mi. per hour. But, neither are we on Earth conscious that we are moving as Earth spins on its axis. Unlike men on Earth who are controlled by gravity, the crew are weightless and lest they drift off into space from their comrades, they must have a propelling device similar to that which skin divers use. Tanks of compressed air which, when released in squirts, will propel these space men in the direction of their choosing.

It will, of course, take time to build this space station which von Braun envisions as three decked and 250 ft. wide. Thus, we have a feeding problem. We have a problem of energy requirement. How much energy does it require to do a given task when one is weightless compared with the same task on Earth?

Time-Frame Problems

After the space station is built, man will move on to photograph Moon from a close vantage point. This trip to Moon may take five days, with five days for the return trip. Later, landings will be made on Moon and working parties established. This causes us to speak of months spent in space or even years.

Trips to the planets are, von Braun says, possible. Such journeys, however, will take years, for the orbit necessary to coincide with Mars requires the space ship to coast through space for perhaps 500 days. The return trip to Earth can only be made at the precise time when Earth is at a point where the returning space ship would intercept it. The wait on Mars for this to occur may be 450 days. Thus, we speak of years.

How will we go about solving these problems? A. A. Taylor of Air Research and Development Command divides the time-frame as 2 to 3 days, 3 days to X number of months, and X number of months to infinity. What are the direct nutritional problems for each of these time-frames?

Water—A Limiting Nutritional Factor

Water is a nutritional problem common to all. So is food. And, as we have mentioned before, so is oxygen and the elimination of waste products of metabolism.

As far as water is concerned, it is believed that a man in a sedentary situation in a temperature of 70° to 75°F. will need about 2200 cc. water per day. This water can be supplied from the water content of the food he eats, from the oxidation of the food he eats, and from the beverage he drinks. In other words, he needs roughly 5 lb. water per day—nearly a ton a year. Water, then, by its weight, becomes a limiting nutritional factor in space flight. In the sealed cabin, it will be possible to recover some water from the atmosphere as it is expired by the lungs of the travellers. Water can also be reclaimed from body wastes. Both of these methods will aid in cutting down the amount of water which must be carried. Water is critical and a limiting factor in space travel for flights of long duration.

Weight and Space Problems

Conventional meals to which man is accustomed on Earth are costly, both in weight and space. In space, flight space and weight obviously are highly critical. It is unlikely, then, that fresh or frozen perishable foods which require complicated and heavy refrigeration equipment will be considered. Neither will foods be carried which require conventional heating devices.

Fresh perishable, ready-to-eat foods preserved by irradiation and therefore requiring no refrigeration give promise for the short trip into space within the first time-frame. In fact, we can even anticipate that for these trips of relatively short duration, the food may, to a considerable extent, be similar to the ready-to-eat conventional foods of in-flight meals supplemented by the irradiated fresh foods.

For the longer flights, many varied plans are en-

visioned. Certainly water must be reclaimed from the air of the space ship and the water of human waste reclaimed and made safe. Certainly, the new types of foods, such as the vacuum-dehydrated and the dehydrated precooked meals, will be essential. Certainly, irradiated foods which utilize atomic or nuclear energy either to sterilize or pasteurize foods to prolong storage life without the need of refrigeration hold the greatest promise. The far-sightedness of the U. S. Army in supporting the Quartermaster Corps in establishing a cooperative military-governmental-industry-university effort to perfect means of preserving food by irradiation will immeasurably contribute to the solution of many nutritional problems associated with space travel. These foods—the meats, poultry, fish, fruits and vegetables, and baked goods—preserved by these methods and packed in flexible containers may well be the staples of the space station's pantry.

Algae to Balance a Closed System

When we think of the last time-frame of X months to X years, the problem of nutrition becomes a major limiting factor. This is where the use of plants as a means of balancing a closed ecologic system is being studied.

Scientists have already presented papers describing the use of green algae as a basis for establishing a symbiotic relationship between plant and man in a closed system. The lowly green algae—with other plants in nature—take sunlight, carbon dioxide from the atmosphere, and nitrogen and other elements from the soil and produce oxygen, carbohydrates, proteins, and fat. Animals eat the plants and in turn convert these food elements into tissues peculiar to themselves. In the process of animal metabolism, waste is returned to the soil and carbon dioxide to the atmosphere which in turn promotes the growth of plants.

For the sealed space ship, if such a balance could be established, oxygen would be provided for the traveller by the plants and carbon dioxide for the plants by the traveller. The plants would be eaten as food and the traveller's waste products of metabolism would be used to nourish and grow new plants.

For setting up such a system, the lowly green algae have been found to be particularly suitable. Five lb. algae can produce enough oxygen to support one man and at the same time clear a given area of man's respired carbon dioxide. The food potential of these lowly plants is exceedingly good, too. Some green algae double their weight twelve times a day. Algae are highly digestible and have a proximate composition of 50 per cent protein, 25 per cent fat, 15 per cent carbohydrate, and 10 per cent ash. The B vitamins, carotene, and ascorbic acid are also present. Thus these plants, supplemented as needed with the other lacking food elements in a pill form, could theoretically serve the traveler from a nutritional standpoint. In addition to the food and oxygen provided, the algae will also serve as the sanitary engineering plant for human waste, which will, in its turn, provide the elements the algae require for growth and maintenance.

Manned flights into planetary space are indeed a logical progression from today's high altitude research planes and multi-stage rocket missiles. Workers in food and nutrition must shoulder the burden of solving the space man's food and nutritional problems.

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Postoperative Diet Therapy[1]

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A SURVEY of current medical practice reveals that progress over the past half century exceeds the advances which hitherto required the whole span of medical history to attain. The results of serious investigation so freely employed in the day-to-day practice of medicine have brought American medicine to new heights in the care of the sick and in the prevention of disease. Medicine and its allied professions quickly grasp and apply the new facets of scientific progress that are pertinent to their practices. The science of nutrition and its clinical use by physicians in diet therapy for specific disease are today no exceptions to this sweeping rule of significant achievement. Despite this, lack of interchanges of information between people leaves wide gaps in the application of available knowledge and the execution of coordinated practices which will best provide the optimal care for the sick in such common clinical situations as postoperative feeding. Many attitudes concerning the practice of medicine in its broad implication have been conditioned and perpetuated by practices initiated years ago by habit and tradition.

Physiologic Alterations after Surgery

Physiologic alterations in the patient during the immediate postoperative period must be examined critically before the foundation on which proper postoperative dietary care can be formulated. Three essential aspects of early convalescence must be considered when a diet is prescribed for a patient following surgery: (a) a thorough and fundamental knowledge relating to the strength of healing wounds after suturing; (b) the timing of the return of gastrointestinal physiologic function as previously altered by the operative trauma; and (c) the ability of man to metabolize nutrient materials irrespective of route of administration in the immediate postoperative period.

Figure 1 is a representation of the current practice in postoperative feeding drawn against the background of the restoration of the normal gastrointestinal activity and the healing strength of the sutured wound. If the principal concern of the operating surgeon is the strength of the healed wound, particularly that after a gastrointestinal anastomosis, it is glaringly apparent from this chart that actually he is feeding his patient in substantial quantity and quality at the precise time the sutured wound is weakest and is only beginning to obtain some of its healing strength. It is not rational to feed a patient, consequently, at this delayed time *solely* on the basis of concern about the strength of the healing wound. If the time for providing nutritional material in the postoperative period were determined entirely by the time at which healing strength of the wound was satisfactory, it should be apparent that it would be necessary to delay any oral intake of food or liquid material until well on into convalescence, for example, the tenth to twelfth postoperative day.

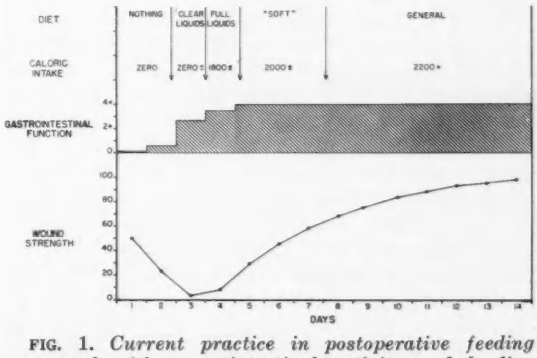

FIG. 1. *Current practice in postoperative feeding compared with gastrointestinal activity and healing strength of the sutured wound after surgery.*

It has been shown (1) that immediately after surgery there is no interference with the body's ability to assimilate and metabolize the essential foodstuffs if they are provided parenterally in proper distribution and adequate amounts. Thus the limiting factor for the provision of food must be the return of gastrointestinal activity.

[1]Presented at the 41st Annual Meeting of The American Dietetic Association in Philadelphia, on October 24, 1958.

Function of Small Intestine

There are three types of muscular activity in the small intestine which take place under normal conditions: peristalsis, segmentation, and pendulation. Distention of the bowel wall by material in the lumen initiates a peristaltic constriction which is dependent on the integrity of the intrinsic nerve plexuses. There is, in addition, a definite influence of the vagus and sympathetic nerves on such activity. Segmentation serves to knead the bowel contents by rhythmic contractions of the circular muscle layers of the bowel wall while pendulation, which results from simple annular constriction of the intestine, causes a shaker-like action mixing the fluid material thoroughly.

Segmentation and pendulation are completely myogenic and depend on the property of intestinal muscle itself or rhythmic contractions. These activities are uninfluenced by parasympathetic or sympathetic nerve impulses. When these coordinated activities of the gastrointestinal tract are clinically manifested postoperatively by audible peristalsis of normal quality and the propulsion of material along the gastrointestinal tract as evidenced by the evacuation of the colon, the gastrointestinal tract is ready to accept food material.

In the immediate postoperative period—for the first 24 to 48 hr. after operation—there is inhibition of upper gastrointestinal secretions. After a brief period, these gastrointestinal secretions return to normal composition and normal volume. This is coincident with the return of gastrointestinal peristaltic activity as evidenced by the clinical examination. Since the secretions of the stomach, duodenum, pancreas, and biliary system total many liters in a day, the internal secretion and reabsorption of these materials actually impose a greater physiologic burden on a gastrointestinal tract functionally than does any oral intake customarily given in the immediate postoperative period. It is well known, also, that by the time ingested material is ready for evacuation from the stomach or the upper gastrointestinal tract, it is essentially a thick, smooth, homogenate of material with no coarse particulation. The adequate stimulus for at least part of the evacuating mechanism of the stomach is the provision of solid material, since it has been shown that a stomach may be distended even up to the point of rupture by liquid material without showing any change in intragastric pressure (2).

It seems evident that the plan of providing patients with liquid material for the first two or three days of a postoperative feeding program is an erroneous conception of safety and a faulty interpretation of an adequate stimulus for gastric digestion and emptying. A complete re-evaluation of the nutritional adequacy of feeding after surgery seems indicated.

For example, let us consider the case of a forty-year-old man weighing 160 lb. and 5 ft. 10 in. in height. From the Boothby-Bergson food nomogram, it is determined that his body surface area is 1.85 sq. m.; basal heat production is 1700 calories. Adjusting these factors and recognizing the energy expenditure resulting from the program of early ambulation as practiced in most hospitals today, it is possible to calculate the patient's minimally restricted hospital activities to require 50 per cent more than basal caloric requirements. Ignoring any reparative requirements, he requires 2500 calories per day to barely maintain adequate nutrition under these circumstances. A review of the caloric values of various postoperative dietary regimens as published in most standard hospital manuals will reveal them to be inadequate. Postoperatively restricted caloric intakes may actually produce a condition inimicable to rapid convalescence in a healthy individual (3). During enforced starvation for a period of time, healthy individuals first experience intense appetites and sensations of hunger; these, however, last only a few days and rapidly become perceptibly diminished. Instead of an eagerness for food, subjects develop a repugnance or an indifference to it. Coincident with this change in appetite, there is a distinct mental depression and feeling of weakness. The complete recovery from the feeling of weakness associated with starvation does not occur until the second or third day after beginning to eat a regular diet.

Conclusion

Under these revised considerations and with some scientific background, one may conclude that there is no rational basis for commonly used methods of providing inadequate nutritional material to the patient immediately after surgery. It seems that in the immediate postoperative period, as soon as gastrointestinal activity indicates that the organism is ready to accept food, it is much wiser to provide something that is esthetically presentable to the eye and nutritionally adequate to the organism. For this reason, as soon as the gastrointestinal activity has returned to normal, hospital practices should be radically altered by physician and dietitian to provide the patient with an attractively served, well balanced, nutritionally sound general diet from which he may select what appeals to him.

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Chemicals in Foods[1]

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THE TITLE of this paper, "Chemicals in Foods," has been selected to focus attention on a particular aspect of food composition. It does not refer solely to the chemical additives in foods, a subject which has received much publicity in recent years, and which is pertinent to the interests of dietitians. It includes the minor chemical constituents other than the fats, carbohydrates, proteins, vitamins, and essential minerals. We ingest these compounds with little knowledge as to what they are in many instances, and with even less knowledge as to their physiologic effects.

The "Bland" Diet

Before discussing the naturally occurring minor chemical constituents of foods, a few comments may be in order as to the nature of a "bland" diet. The medical dictionaries define bland as "mild, unirritating, soothing." This definition makes a pharmacologist think in terms of emollients and demulcents which include oils, neutral fats, gums, and various colloidal materials. Through their adhesive properties, the emollients and demulcents tend to form a covering on the surfaces to which they are applied. Oils decrease the absorption of water-soluble substances, gums decrease the absorption of fats and resins. Fats tend to decrease gastric secretion and acidity and decrease gastric peristalsis.

Another characteristic of "bland" diets has been a minimal content of crude fiber or roughage. When the question is raised as to why certain foods may be irritating and promote gas formation in patients on bland diets, it may be that we should take a second look at the advisability of keeping dietary roughage minimal and of incorporating items which are soothing, which decrease peristalsis, and which perhaps interfere with the absorption of gas from the gastrointestinal tract into the blood.

Alvarez discusses the subject of "Gas in the Bowel," in *An Introduction to Gastro-Enterology* (1). He points out that much of the gas is swallowed air and that gas is continually getting into the bowel and is continually being excreted through the lung after being absorbed into the blood stream. In the healthy person this process is so well balanced that there is no distress and rarely any flatus. The balance may be upset and flatulence appear in any condition which leads to: a greater swallowing of air, a slowing or stoppage of the intestinal current, an interference with digestion, an interference with intestinal absorption, an interference with circulation of blood in the intestines, an interference with gas-carrying power of the blood, or an interference with exhalation from the lungs.

The slowing or stoppage of the intestinal current mentioned above may occur in some individuals even on a bland diet due to an allergic response to some dietary constituent, the allergy resulting in a nontraveling type of spasm of long segments of the bowel with the result that gas cannot be passed along. A bland diet completely free of intestinal irritants is not likely to provide relief in such a situation. The value of mild irritants in such a condition, when their use is not contra-indicated for other reasons, can be appreciated through an understanding of the mechanism of action of carminatives, such as mints and anise. These mild intestinal irritants tend to relieve spasms of intestinal muscle and stimulate peristalsis so that gas is passed outward. At this point we may return to the subject of the minor chemical constituents in foods since their isolation, their identification, and a study of their physiologic effects may in the future, in some instances, prove to be pertinent to the interests of dietitians.

Naturally Occurring Chemicals in Foods

During the process of evolution, all mammals, including man, have learned that certain plants and animals when used as food are reasonably compatible with life. This does not rule out the possibility that these foods would be more satisfactory or less satisfactory if they were devoid of various non-food chemicals occurring naturally. Before the advent of

[1] Presented at the 40th Annual Meeting of The American Dietetic Association in Miami, on October 24, 1957.

modern synthetic drugs, the therapeutic agents used by the physician consisted largely of the galenical preparations. The galenicals are the crude drugs, infusions, decoctions, and tinctures prepared from medicinal plants. It seems quite unlikely that during the evolution of living things, all drugs, i.e. all physiologically active chemicals, should become limited to the non-food materials. It is much more likely that physiologically active chemicals are present in our foods, and that the sum total of their effects contributes to our present concept of an acceptable standard of health.

At a time when there is an awakened interest in the subject of chemicals in foods as evidenced by the publicity arising out of the hearings of the Congressional Delaney Committee, it is appropriate that serious attention be given to the naturally occurring non-nutrient chemicals. It is obviously false to assume that chemical additives — those substances finding their way into foods accidentally or intentionally as a result of using pesticidal agents and food processing aids—are inherently harmful and that the naturally occurring compounds are inherently harmless.

The comparative toxicologic importance of these two classes of compounds in foods has been commented on by Frazer (2) as follows: "The addition of either natural or synthetic chemicals to food carries a potential risk to the consumer if the pharmacological action of the substance in this dietary context is not known. Synthetic chemicals are no more likely to be toxic than natural substances—indeed, many of the most potent poisons known are of natural origin. Substances that have been consumed as food for centuries are not necessarily harmless, since millions of people have died from unknown causes over the same period. In fact, there is ample evidence to indicate that certain foods can cause harmful effects. Some people are allergic to particular articles of diet and may develop alarming symptoms after eating them even in small quantities. Wheat-gluten has recently been shown to be deleterious to children with celiac disease. Dietary characteristics may account, at least in part, for differences in the incidence of such conditions as cirrhosis of the liver and atherosclerosis. Thus, many natural constituents of the diet may have harmful potentialities. The diet must be regarded as a part of the environment of man, and one of the factors that may determine the life-span of the individual. The problems of chemicals in food fall into their proper perspective when examined against this broader background."

Non-Food Chemicals

From time to time there have appeared in the scientific literature reports concerning the presence of non-food chemicals in foods and feeds. In some instances, these compounds have been identified and associated with the symptoms due to their physiologic effects, and in other instances no investigations on physiologic effects have been made. In a few cases physiologic actions are known to exist, but the chemicals responsible for these effects have not been isolated and positively identified.

The following is a list of the non-food chemicals which readily come to mind from a knowledge of the literature: flavonoids, aconitic acid, phytic acid, chlorogenic acid, caffeic acid, oxalic acid, dicumarol, thiaminase, antiamylase, antitrypsin, erucic acid, pipecolic acid, solanine, pellagragenic factor, sesamin, sesamolin, sesamol, samin, gossypol, tomatine, selenium, avidin, a substance producing methionine deficiency (soybeans), goitrogenic substances, antigoitrogenic substances, 2,2′-dithiolisobutyric acid (asparagus), and purothionine. A review of the literature would doubtless reveal other examples of naturally occurring non-food chemicals, some of which may have important physiologic properties.

Physiologic Effects of Some Non-Food Chemicals

A brief review of the physiologic effects produced by some of the compounds listed above will suffice to justify the suggestion that a systematic examination of the various foods for organic constituents possessing physiologic properties would reveal the presence of many chemicals, some valuable, some detrimental.

In those cases where information on physiologic effects is available, the examples listed above reveal a variety of mechanisms of action. The flavonoids are widely distributed in foods as the aglycones, glycosides, and less often as glucuronides. None of the flavonoids studied to date have been found harmful. Instead, several of them have been shown to have a sparing action on ascorbic acid and to exert beneficial physiologic effects through mechanisms imperfectly understood at the present time.

Aconitic acid isolated from sugar cane exists as the trans-isomer. Unpublished data obtained in the Pharmacology Laboratory have shown that when trans-aconitic acid is administered to animals, it acts competitively with the cis-aconitic acid of the Krebs metabolic cycle. This results in the urinary excretion of certain carboxylic acids of the Krebs cycle not ordinarily excreted except in trace amounts.

The phytic acid of cereal crops and the oxalic acid of certain fruits and vegetables, when consumed in excess or ingested with a low-calcium diet, interfere with calcification, a fact of particular importance during periods of growth.

Erucic acid is found in rape seed and many vegetable oils. A recent report by Carroll states (3) that those vegetable oils which cause the greatest in-

creases in adrenal gland cholesterol in the rat are characterized by their high content of erucic acid. Studies on the fractionation of rape seed oil showed that erucic acid is chiefly responsible for this storage of adrenal cholesterol.

Other Physiologically Active Chemicals

Zacharius and associates (4) have isolated pipecolic acid (piperidine-2-carboxylic acid) from fresh green beans. It is also present in potatoes and the edible mushroom, and in the fresh fruit and dry seeds of legumes. A preliminary search of the literature has not revealed information on the pharmacologic effects of pipecolic acid.

Another example of an organic food constituent which has not been investigated for physiologic effects is the non-protein sulfhydryl substance isolated from edible asparagus by Jansen (5) and identified as 2,2′-dithiolisobutyric acid.

A crystalline sulphur protein (purothionine) has been isolated from wheat flour by Balls and coworkers (6). This material was shown to be toxic when injected intravenously in guinea pigs, rabbits, or mice, and when given intraperitoneally in guinea pigs or rabbits. The isolated guinea pig uterus is markedly contracted by this product. This reaction closely resembles that produced by histamine. The bactericidal and fungicidal properties of this wheat protein fraction were tested. It was found to be more active against gram-positive than against gram-negative organisms. The fact that yeasts and yeast-like fungi were killed in concentrations ranging from 0.0001 to 0.005 mg. per milliliter suggests that this "substance may be the yeast-poisonous principle long known by bakers and brewers to be present in wheat flour."

Many kinds of raw beans contain a trypsin inhibitor. In the case of Navy beans, it was reported by Bowman (7) that a simple aqueous extract contained a heat-labile antiamylase as well as a trypsin inhibitor. Such factors account in part for the poor nutritive value of raw beans.

In the case of soybeans, the situation is further complicated by the presence of another factor in the antitryptic fraction as shown by Pallansch and Liener (8). These authors showed fractionation and purification of the antitryptic fraction yielded a product practically free of antitryptic action but having marked ability to agglutinate the red blood cells.

Exploratory experiments in the Pharmacology Laboratory, in cooperation with H. S. Olcott, suggest strongly that the antitryptic factor of raw beans is not entirely responsible for the poor growth of rats. It has been reported that blackeyed beans contain a trypsin inhibitor. Rats receiving red Navy beans failed to grow while those receiving blackeyed beans grew well. Rats receiving a Lima bean extract concentrate grew more poorly than controls, but better than those receiving the whole bean, and showed enlargement of the pancreas. As reported by others, it was found that germination of beans slightly decreased the growth inhibition without influencing the antitryptic activity. It seems obvious that more research should be done on the toxic factors in beans.

The dermatitis caused by Pascal green summer celery has been reported to be a serious economic problem in Massachusetts. Since 1939 large numbers of farm workers have been affected by a dermatitis resulting from handling the celery. At times the dermatitis has been severe enough to incapacitate some workers. A recent report by Palumbo and Lynn (9) traces the cause of the dermatitis to a volatile oil occurring to the extent of about 0.005 per cent of the fresh above-ground portion of the celery grown in that region.

A final example of the presence of physiologically active compounds occurring naturally in foods and feeds is found in the wide distribution of goitrogenic and antigoitrogenic substances. It is well known that the incidence of goiter is greater in certain geographical areas than in others. A rather widely accepted explanation has been that such endemic areas are locations where the population has a low iodine intake. Present evidence suggests that even in the presence of adequate iodine in the diet its assimilation by the thyroid gland may be inhibited by the ingestion of goitrogenic substances present in certain dietary items.

More recently Astwood and associates (10) isolated a goitrogenic compound from rutabagas and identified it as 1-5-vinyl-2-thiooxazolidine. The same compound was isolated from cabbage, kale, and rape seeds. In man, the antithyroid potency of the compound was found to be equal to that of thiouracil. Single doses of 100 mg. in four subjects completely inhibited the uptake of radioactive iodine by the thyroid gland for 4 hr., and 200 mg. in two subjects were completely inhibiting for 24 hr. This compound is not necessarily identical with the unidentified material in the edible portions of the Brassicae tested by Marine and associates (11).

Conclusion

The wide variety of minor chemical constituents occurring naturally in foods and the diverse physiologic effects produced by those that have been investigated emphasize: (a) the need for a systematic investigation of this relatively unexplored field of research; (b) the desirability of recognizing that these minor chemical constituents may be fully as important to the health of the consumer as are chemical additives; and (c) that the dietitian should be as interested in these constituents as in chemical additives.

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The Problems of Weight Control

Obesity is a psychosomatic disorder with psychologic and somatic determinants. It may be said to exist in an individual when the body fat content reaches 20 per cent of body weight in the male and 30 per cent in the female. These increases in body fat correspond generally to an increase in body weight of about 15 per cent over desired weight (average weight at age twenty-five). Obesity reaches its maximum prevalence in middle age, a period when energy expenditure tends to decrease and emotional tensions and responsibilities tend to increase. Both inactivity and specific psycho-social traumas may initiate obesity.

A population of 400 obese subjects of middle age (forty to sixty years old) and 25 per cent over desired weight are being studied in the Nutrition Clinic of the University of Pittsburgh. The subjects have been given a comprehensive examination including dietary history, medical history, physical examination, and laboratory studies, the latter designed to measure total serum protein, lipids, and lipoproteins, as well as electrocardiogram and urinary analysis. These subjects were then offered diet therapy featuring principally reduction in calories and fat. They have been studied at monthly intervals for a two-year period.

We have been impressed by the fact that the dietary information obtained at admission, although showing a wide range of caloric intake, shows a cumulative distribution curve equivalent to that obtained in non-obese individuals surveyed in many different areas of the United States. The mean intake for obese women in our study is 1815 calories and that of men, approximately 2600 calories. These data strongly suggest that obese subjects maintain their obesity at caloric intakes not appreciably different from those required for the maintenance of normal weight in healthy individuals.

Attempts at weight reduction must be carried out with the idea of replacing the patient's emotional need for food with some other kind of emotional support. In our study, adherence to prescribed diets has not been precise and, in many instances has vitiated attempts at weight reduction, particularly for hypophagic individuals. The observed weight reduction has averaged about 25 lb. over a one- to two-year period, and attempts to achieve greater weight reduction in many patients have not met with success, even though they are still obese.

The effects of weight reduction on blood pressure, level of serum cholesterol, and symptoms have been variable. It is clear that the clinical and biochemical signs of illness associated with obesity do not fully regress with the degree of weight reduction (20 to 60 lb.) which can be obtained with good out-patient management.—*Abstract of paper delivered at the 41st Annual Meeting of The American Dietetic Association in Philadelphia on October 23, 1958, by Robert E. Olson, M.D., Ph.D., Professor and Head, Department of Biochemistry and Nutrition, Graduate School of Public Health, University of Pittsburgh.*

Adaptation to a Low-Calcium Intake[1]

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MANY WORKERS have studied the calcium requirement of adults but the subject needs further study because of the question of the ability of the individual to adapt to low levels. If individuals can adapt, the requirement may not be as high as has been thought. The possibility of adaptation is not a new idea: one worker in the twenties (1) and several workers in the thirties (2-5) presented evidence for it. Recently Hegsted *et al.* (6) and Nicolaysen *et al.* (7) have worked on the problem.

This study was designed to ascertain whether some people adapt to a low-calcium intake and if so, whether as little as 230 mg. or even 180 mg. per day will cover their needs. Space will not allow a review of all the studies on calcium balance in the literature in which the intakes were low. In many of them no mention of the customary diet of the subjects is made and consequently the reader has no way of knowing whether the subjects had been given opportunity to adapt. An intake of approximately 350 mg. was studied by Hegsted *et al.* (6), who conducted balance studies on ten men living in a prison in Peru, whose diets had been low in calcium. The men retained 19 mg. on an intake of 362 mg., and 29 mg. on an intake of 338 mg. These intakes are adequate if the retentions are large enough to cover small losses such as occur in perspiration, hair, nails, and skin. Nicolaysen *et al.* (7) studied calcium balance in men with intakes of from 400 to 500 mg. over a long enough period of time for adaptation to take place and reported that the men adapted to that level. Since the detailed experimental results of this study have not yet been published, the writers do not know whether the subjects retained enough to cover the small losses.

Procedure

The following is a report of two studies made in the spring; one in 1955 and the other in 1957. The subjects in 1955 who had low habitual intakes will be referred to as 1 and 2; those with high habitual intakes as 9 and 10. The subjects in 1957 who had low habitual intakes will be referred to as A, B, and C and those with high habitual intakes as W, X, Y, and Z.

In 1955, four young men were placed on a balance study for sixteen days, preceded by a four-day adjustment period. A carefully controlled diet containing approximately 180 mg. calcium per day was administered. Two of the subjects, eighteen and nineteen years of age, were allergic to milk and accustomed to low-calcium intakes while the other two, twenty and twenty-one years of age, had been living on high intakes. All were tall; three were over 182.9 cm. (6 ft.) (Table 1).

In 1957 seven young men were placed on an intake of approximately 230 mg. calcium per day for a period of ninety-five days. Balance studies were conducted for sixteen days following a four-day adjustment period and for sixteen days at the middle and at end of the experimental period. The middle period began on the forty-first day of the experimental period. Three of the men were accustomed to low calcium intakes and four to high ones. No subject younger than twenty-two years of age was accepted because of the probability that the high percentage of calcium absorbed by the two low-calcium subjects in 1955 could be at least partly attributed to a continuation of growth. The oldest subject was twenty-nine years old. The heights of the subjects varied widely, from 163.8 to 193.0 cm. (Table 1). Measurements of bi-ilio cristal diameter were made with sliding calipers. Three of the seven men, Subjects A, C, and Y were of narrow build as judged by classifications defined by White (8), who measured 2650 American-born white males twenty-five years of age; the others were of medium build. Height and width were the factors used in the classification system.

In 1957 bone density coefficients were determined

[1] Received for publication September 12, 1958.

TABLE 1 The age, height, weight and width of the subjects

SUBJECT	AGE*	HEIGHT†	WEIGHT‡	BI-ILIO CRISTAL DIAMETER#
Subjects Accustomed to a Low-Calcium Intake				
1955	*yr.*	*cm.*	*kg.*	*cm.*
1	18	187.3	64.0	—
2	19	184.8	70.3	—
1957				
A	25	193.0	68.2	29.1
B	29	172.1	70.9	28.8
C	28	163.8	48.2	25.2
Mean . . .	24	180.2	64.3	27.7
Subjects Accustomed to a High-Calcium Intake				
1955				
9	20	186.7	71.3	—
10	21	176.5	62.2	—
1957				
W	25	180.3	92.5	30.1
X	25	180.3	79.3	29.1
Y	22	177.8	61.4	26.1
Z	23	171.4	71.2	27.4
Mean . . .	23	178.8	73.0	28.2

*Age to nearest birthday.

†Height with shoes removed.

‡Weight at the beginning of the experiment taken before breakfast without shoes, jackets, or sweaters.

#Taken by one of the subjects trained by a nutritionist with experience in physical anthropology.

at the beginning of the experimental period for all seven men; four were given calcium infusion tests at the end. Roentgenograms of the teeth revealed that the condition of the teeth of all the subjects was poor and poorest for the subjects who had been living on high-calcium intakes. Subject C, who had been living on a Filipino diet, low in calcium, had the fewest fillings and caries.

Several weeks prior to the beginning of the controlled diet, the subjects in both 1955 and 1957 kept a dietary record for one week. They estimated the sizes of servings of vegetables, fruits, and desserts as small, medium, or large; liquid foods in terms of cups; and dry foods in cubic inches. Recipes for some of the dishes were obtained from the institutions where the subjects dined. The calcium content of the foods was calculated from the values listed by Watt and Merrill (9). The men were interviewed regarding their intake of high-calcium foods since infancy as well as during the previous fall to learn whether the diet during the recorded week was typical. In 1957, one 24-hr. urine collection was made during the week the dietary record was being kept.

The controlled diet of the experimental period, with the exception of calcium, was planned to meet the Recommended Dietary Allowances (10). Every four days the diet was supplemented with 5 mg. riboflavin. In 1957, 1000 I.U. vitamin D were added to the orange juice every fourth morning and the subjects took 1445 U.S.P. units of vitamin D on each of three days prior to the controlled dietary period.

The basal diet was made up of a wide variety of common foods but contained no milk or cheese. The menus were planned for four days and were repeated five times in 1955 and twenty-four times in 1957. The menus used in 1955 and 1957 were alike except that in 1957 two servings of fruit, two of vegetables, one egg, and 40 gm. meat were added in each four-day period and a serving of hominy and one of corn meal were replaced by potatoes. This was done to increase the calcium intake a little and bring it up to about 230 mg. per day. Distilled water was used in cooking and for drinking. To meet the varying caloric needs, certain foods low in calcium, mainly bread made with water, and butter, were allowed *ad libitum*. The subjects were weighed periodically and regulated their caloric intake to maintain constant weight. They were given a mixture of sodium chloride and sodium bicarbonate to use as a dentifrice.

Four-day composites of the food in the basal diet were heated with hydrochloric acid after mixing in a mechanical blender. Each food allowed *ad libitum* was prepared for storage in a similar fashion. The feces were marked with carmine every four days, were made into four-day composites, heated with hydrochloric acid, and put through a Büchner funnel. Enough hydrochloric acid was added to the four-day composites of urine to make a 2 per cent solution. The food and feces were dry-ashed at 500°C. for 20 hr. and the food was re-ashed for 20 hr. In 1955 the urine was ashed but not in 1957 except for that collected during the infusion test. Calcium was determined by the micro-method for plants described in the official methods of the Association of Agricultural Chemists (11) except that in 1957 the precipitated calcium oxalate was dissolved in perchloric acid and titrated in a darkened room with ammonium hexanitratocerate according to the method of Salomon *et al.* (12).

Results and Discussion

HABITUAL CALCIUM INTAKES

According to the one-week records, usual calcium intakes were 450 and 750 mg. per day for Subjects 1 and 2 (1955 study), those accustomed to a low-calcium diet (Table 2). The intakes are lower than they might first appear because both men were tall. Subject 1 had been allergic to milk since infancy and consequently his intake of calcium had always been limited. The allergic condition of Subject 2 had been diagnosed at twelve years of age, and while he had reduced his intake of milk, he had not re-

duced it to an unusually low level; he ate some cheese, ice cream, and puddings made with milk. His 750-mg. intake during the week of the dietary record did not include cheese sandwiches late in the evening which he stated he had been eating during the fall, although he had not done this before.

TABLE 2 **Customary calcium intake and balance data for three sixteen-day metabolic periods**

SUBJECT	CALCIUM					
	Customary intake	Experimental intake from food	Fecal excretion	Urinary excretion	Balance	Apparent absorption*
Subjects Accustomed to a Low-Calcium Diet						
	mg./day	*mg./day*	*mg./day*	*mg./day*	*mg./day*	%
Subject 1 (1955)	450	181	58	30	+ 93	68
Subject 2 (1955)	750	175	83	82†	+ 10	53
Subject A (1957)	700					
Period I		228	213	101	− 86	7
Period II		215	203‡	88	− 76	6
Period III		224	199	91	− 66	11
Subject B (1957)	550					
Period I		232	170	182	−120	27
Period II		214#	140	163¶	− 89	35
Period III		232	150	157	− 75	35
Subject C (1957)						
Period I	350	212	177	59¶	− 24	17
Period II		190‖	164	60	− 34	14
Period III		162‖	125	65	− 28	23
Mean (1957)						
Period I		224	187	114	− 77	17
Period II		206	169	104	− 67	18
Period III		206	158	104	− 56	23
All periods		212	171	107	− 67	19
Subjects Accustomed to a High-Calcium Diet						
Subject 9 (1955)	2000	186	145	258	−217	22
Subject 10 (1955)	1500	196	176	112	− 92	10
Subject W (1957)	1250					
Period I		256	177	160	− 81	31
Period II		250	162	121	− 33	35
Period III		254	181	135	− 62	29
Subject X (1957)	1500					
Period I		236	211	178	−153	11
Period II		237	204	200	−167	14
Period III		244	206	149	−111	16
Subject Y (1957)	1300					
Period I		241	146	169¶	− 74	39
Period II		220**	177	155	−112	20
Period III		237	158	155	− 76	33
Subject Z (1957)						
Period I		219	193	173	−147	12
Period II		212	181‡	178	−147	15
Period III		216	176	160†	−120	19
Mean—1957						
Period I		238	182	170	−114	24
Period II		230	181	164	−115	21
Period III		238	180	150	− 92	24
All periods		235	181	161	−107	23

*Fecal calcium subtracted from food calcium, with no correction for endogenous calcium.

†Urinary values were based on three-day composites for two of the four four-day collection periods.

‡Fecal values based on twelve days.

#Due to a brief illness, a few foods were omitted from the basal diet for four days.

¶Urinary values were based on a three-day composite for one of the four four-day collection periods.

‖Subject C was allowed to omit certain low-calcium foods in the basal diet and ate less of the foods allowed *ad libitum* than other subjects. In addition, in Period III, he omitted certain foods high in roughage.

**Due to a brief illness, a few foods were omitted from the basal diet on one day.

The intakes of Subjects 9 and 10, who were accustomed to high-calcium diets, were 2000 and 1500 mg. per day respectively (Table 2). This was probably near the intake on which they had been living for most of their lives.

The one-week records reported in 1957 by Subjects A, B, and C, accustomed to low calcium, indicated intakes of 700, 550, and 350 mg. per day respectively (Table 2). Subject A stopped drinking milk at about twelve years of age, except for a two-year period eighteen months prior to the experiment when he was in the military service and drank a pint of milk a day. Subject B had only limited his milk intake during the six years before the experiment when he began to take only about four glasses a week. He then reduced his intake to about two glasses a week for the eight months before the experiment. Subject C had lived on a low-milk intake all his life. He had a small amount as a child. He was a Filipino and had lived on the customary diet of the people of that country. His intake of 350 mg. is higher than it may first appear because he was short and of narrow build.

The intakes of the four subjects accustomed to high-calcium diets ranged from 1250 to 1500 mg. per day (Table 2). This was probably typical for all except possibly Subject Y whose intake for a few years before his tenth birthday may have been somewhat limited. He was living in England and was subject to rationing; the amount of milk permitted during that period for children varied from time to time but was never less than one-half of an English pint per day.

CALCIUM INTAKE DURING THE DIETARY PERIOD

In 1955 the mean daily intake of calcium of the four subjects during the sixteen-day period ranged from 175 to 196 mg. (Table 2). Variation was due mainly to the amounts of foods permitted in unlimited quantities that were consumed. According to calculations from the weight of food eaten, the daily protein intake ranged from 85 to 91 gm. and the caloric intake from 3120 to 3410. All subjects maintained constant weight.

In 1957 the mean daily intake of calcium of all seven subjects during three sixteen-day periods was 232 mg. (Table 2) when Subject C was excluded. His intake of 188 mg. was low because, being small in size, he omitted some of the items in the basal diet and also because in the third metabolic period he omitted certain foods of high fiber content in an attempt to control a persistent looseness of feces which had begun at the start of the experiment and continued throughout. (The phosphorus content of the diet was found by determination to be 1043 mg. per day.) By calculation from the weights of the foods consumed, the daily protein intake was found to range from 85 to 105 gm. and the calories from 2630 to 3910. All subjects maintained constant weight.

CALCIUM RETENTION IN 1955

In 1955 there was a big difference in the amounts of calcium retained by the two groups of subjects. Subjects 1 and 2, accustomed to a low calcium intake, retained 93 and 10 mg. per day respectively (Table 2), while Subjects 9 and 10 lost 217 and 92 mg. respectively. This wide difference was due to both a high percentage of absorption by the pair accustomed to low calcium with poor absorption by the other pair and to a small loss of calcium in the urine by the low-calcium pair with a high loss by the other one. This appeared to be a clear picture of adaptation by the subjects accustomed to a low-calcium intake. The possibility of growth as a factor, however, had to be considered. Three years after he had served on the balance study, Subject 2 had grown ½ in. Subject 1 had not grown and stated that he had not grown for several years before the study. Even though he needed no calcium for added stature, he may have had need of the element because he had been unable to retain enough from his customary intake of 450 mg. to complete the calcification of his bones. His needs must have been quite high during his years of maximum growth because he was unusually tall. Subjects 9 and 10 were twenty and twenty-one years old, not much older than the other two, but enough older that they may have reached a point where growth was no longer a factor.

There are several possible causes of the high retention of Subjects 1 and 2: an habitual low-calcium diet, a possible effect attributable to the allergic condition in itself, and growth. The results of the 1955 study were not published at the conclusion of the study because of the small number subjects and because of a desire to learn whether older subjects would behave in the same way.

RETENTION OF SUBJECTS IN 1957

In 1957 with subjects a few years older, no retentions similar to those of the two low-calcium men studied in 1955 occurred. All subjects were in calcium deficit. The difference between the two groups was not large. The mean amount lost in the first metabolic period by the three men accustomed to a low intake was 77 mg. per day (Table 2); by the four accustomed to a high intake, 114 mg. When the values for individuals were examined, the difference became less evident. While the two subjects who lost the most calcium were habituated to a high intake and the subject with the lowest loss was one accustomed to a low intake, there was overlapping among the other four subjects. Thus there was no clear evidence of adaptation on the part of the subjects who had been living on a low-calcium diet.

That the absorption of calcium is a factor in the retention is seen from the fact that if calcium absorption is increased, retention will be improved provided the urinary loss remains unchanged. The percentages of absorbed calcium show no superiority of absorption by the subjects accustomed to low intakes. In Period I, low-calcium Subject A absorbed the least, 7 per cent (Table 2), while high-calcium Subject Y absorbed the most, 39 per cent. This is the reverse of what would have occurred had adaptation taken place. The amount absorbed varied widely among the subjects. The values reported are for apparent absorption as found by subtracting the calcium in the feces from that in the food; they do not take into account the endogenous calcium in the feces. Values for true absorption would be much higher.

If the values for apparent absorption are compared to a mean of 14 per cent found by Brine and Johnston (13) in a compilation from the literature of subjects on intakes of 200 to 399 mg. per day, the amounts—27, 31, and 39 per cent—absorbed by Subjects B, W, and Y, respectively, are high. Possibly, therefore, these subjects had already adapted. On the other hand, possibly Subjects X, Z, A, and C, who absorbed only 7 to 17 per cent, might have absorbed more had the dietary period been conducted in the late summer or early fall. February and March, two of the months covered by the present study, were found by McCance and Widdowson (14) to be the months in which three out of their six subjects retained the least.

The mean urinary loss of the high-calcium group in Period I was 170 mg. per day (Table 2), while Subjects A and C of the low-calcium group lost 101 and 59 mg. respectively. The loss of the third low-calcium man, Subject B, was high, 182 mg.

On their self-selected diets during the week of the dietary record, there was quite a contrast in the amount of calcium in the urine of the two groups. Low-calcium Subjects A, B, and C excreted 167, 164, and 126 mg. per day respectively while high-calcium Subjects W, X, Y, and Z excreted 262, 297, 271, and 235 mg. respectively.

An initial suppression in the calcium content of the urine in the first four-day collection period, which was considered as an adaptation period and not included in the mean for Period I, was noted in the four men in the 1957 group and the two in the 1955 group who drastically reduced their calcium intakes when they started on the low-calcium diet of the experiment. For example, the mean daily values for the first three four-day collection periods for Subject X were 144, 162, and 160 mg. and for Subject W were 128, 149, and 163 mg. A similar suppression was not noted in 1955 and 1957 for any of the five subjects accustomed to low intakes, not even in the cases of Subjects A and 2 whose previous diets had contained 700 and 750 mg. per day respectively.

ADAPTATION DURING 95 DAYS

One object of the experiment conducted in 1957 was to determine whether the subjects would adapt during the ninety-five days while they were on a diet of lower calcium content than the one to which they were accustomed. Even the subjects accustomed to low-calcium intakes had not been living on intakes as low as 232 mg. and thus might have made some adaptation. Five of the seven subjects appeared to be adapting in that they lost less calcium in Period III than in Period I. Of the two who did not, one (Subject C) had been living on such a low-calcium intake that he probably was already adapted to the 230-mg. intake. The decrease in calcium loss from the body between Periods I and III was large for Subjects B and X, being 45 and 42 mg. per day (Table 2), respectively. The differences of 20, 19, and 27 mg. for Subjects A, W, and Z were small. These values for over-all decrease in loss were the net result of increases in the percentage absorbed and decreases in urinary loss.

The percentage of calcium absorbed by five of the seven subjects increased from 4 to 8 from Period I to III and remained essentially the same in the case of Subject W. Subject Y absorbed 6 per cent less in Period III than Period I. He absorbed so poorly in Period II when he had a brief illness that he dragged down the mean for the group for that period. Considering all the factors that affect human beings and the finding of Malm (15) that some persons absorb in a wave-like fashion, this is as consistent a change as could be expected.

The calcium content of the feces would likely have continued to decrease had the experiment been extended. The only other group of workers who, to the authors' knowledge, have followed subjects for a long time after a decrease in intake is Nicolaysen *et al.* (7). They maintained fourteen men on an intake of 900 mg. calcium per day until they stabilized at that level; then they dropped the intake to between 400 and 500 mg. The apparent absorption of twelve of the men improved in two to eight months, one improved immediately, and the amount absorbed by the other was not reported. An intake as low as the one used in the present study was not investigated; also the total change in intake differed from that used in the present study.

A decrease in endogenous fecal calcium might have occurred eventually and further increased the apparent percentage of calcium absorbed. Blau *et al.* (16) found with the use of radioactive calcium that when the calcium intake of two subjects was increased, no rise in endogenous calcium was noted during forty-eight days of a higher intake. Comar and Wasserman (17), who also used radioactive calcium, found "cattle on a low-normal calcium intake for six months, as compared with animals on a high

level, showed no differences in faecal endogenous calcium. After fifteen months the animals on the low level had adapted by about a 30 per cent reduction in faecal endogenous loss."

That the subjects accustomed to a low-calcium intake were not all absorbing a high percentage at the beginning of the ninety-five days seems strange since the percentage of absorption increased during experimental period. This may be explained by the wide variability in the amount of calcium absorbed in comparison with the magnitude of changes due to adaptation. For example, low-calcium Subject A absorbed 7 per cent at the beginning of the dietary period. Had he doubled the percentage due to adaptation to a lowered intake, he would still have absorbed far from the 30 per cent absorbed by some subjects. Then, too, the number of low-calcium subjects was so small that a very consistent performance would have been needed to demonstrate differences.

The urinary loss of calcium of all subjects, except Subject C whose excretion of calcium was already low, was less in Period III than in Period I. The changes were small, from 10 to 29 mg. and the mean change, with Subject C excluded, was 20 mg. Small changes in the calcium content of the urine mean more than small changes in the content of the feces because the division of urine is more exact than division of feces. Adaptation due to a decrease in urinary loss probably would have continued had the experiment been extended, because the loss was still much higher than that of the low-calcium subjects other than Subject B.

ADEQUACY OF THE INTAKE

The authors are inclined to believe that neither the 180 mg. of the diet in 1955 nor the 230 mg. in 1957 was adequate for the subjects, except for Subject 1 who possessed unusual ability to retain calcium.

Possibly most of the subjects past twenty-one years of age eventually would have adapted until they absorbed 30 per cent of the intake since some were absorbing that much. Thirty per cent of a 230-mg. intake is 70 mg. If equilibrium were to be attained, the urinary loss would have to be no more than 70 mg. Possibly most of the subjects eventually would have lost as little as that in the urine since most of those accustomed to low intakes lost 60 to 90 mg. Consequently, they might have come into equilibrium but would not have retained enough to cover the small losses, such as those in perspiration, skin, hair, and nails.

TABLE 3 Bone density coefficients of the phalanx 5-2 of the left hand determined at the beginning of the experiment

SUBJECT	BONE DENSITY COEFFICIENTS*	
	Center	Ends
Subjects Accustomed to a Low-Calcium Intake		
A	1.30	0.91
B	1.29	0.92
C	1.60	1.07
Mean . . .	1.40	0.97
Subjects Accustomed to a High-Calcium Intake		
W	1.88	1.39
X	1.24	0.95
Y	1.56	1.06
Z	1.52	1.02
Mean . . .	1.55	1.10

*Mean of coefficients from two films exposed simultaneously on the third day of the controlled dietary period.

BONE DENSITY

Bone density coefficients of the subjects who served in 1957 were determined at the beginning of the experimental period. The findings were, therefore, attributable to the subjects' past dietary habits and not to the 230-mg. experimental intake. Two roentgenograms of the left hand of each subject were made on films exposed simultaneously. They were sent to the Bone Density Research and Evaluation Center at The Pennsylvania State University where bone density coefficients were determined on the center and ends of phalanx 5-2.

The coefficients ranged from 1.24 to 1.88 for the centers and from 0.91 to 1.39 for the ends (Table 3). The values for phalanx ends may be compared with the mean of 1.07± 0.02 for sixty-one college men mostly seventeen to twenty-one years of age reported by Fisher and Dodds (18). Three of the four men accustomed to high-calcium intakes had values of 1.52 and 1.02 or higher for centers and ends respectively, and two of the three men accustomed to low-calcium intakes had mean values of 1.30 or less for the center and 0.92 or less for the ends. Subject C, the third low-calcium subject, had higher coefficients. He was a short man of narrow build (Table 1).

These findings indicate a correlation between long-continued calcium intake and bone density. The correlation is as good as can be expected with human subjects, but the number of subjects is so small that the correlation may be due to chance. Williams *et al.* (19), who determined the bone density of a group of college women, believed there was a correlation between habitual diet and bone density, but Fisher and Dodds found no correlation.

No information regarding the size of coefficient that is desirable is available. Whether calcification which permits a coefficient of 0.91 for phalanx ends, the lowest among the seven subjects, is too low for safety is not known. Of the three subjects, B, A, and X, who had the lowest coefficients, Subjects A and X absorbed calcium poorly. Subject B absorbed well

but lost more inthe urine than the other low-calcium subjects.

CALCIUM INFUSION TESTS

Four of the subjects in 1957 were given calcium infusion tests after three months on a mean intake of 232 mg. calcium. Calcium gluconate in glucose solution was infused into a vein over a period of 4 hr. according to the procedure of Spencer *et al.* (20) except that the diet of the experiment containing 232 mg. calcium and 1043 mg. phosphorus was employed instead of 150 mg. calcium and 600 mg. phosphorus used by them. Urine was collected for three one-day periods before, during, and after the infusion. The infusion test has been used to diagnose bone diseases; it has not been used to measure stores but was employed here with a part of the subjects to explore the possibility of its use for this purpose. The amount of calcium in the urine on the day preceding the test varied considerably from the usual amount and therefore the mean daily amount in the last metabolic period was used in calculating the percentage of the 475 mg. infused calcium that was retained.

The percentage retained ranged from 40 to 60 (Table 4) and indicated no difference between the subjects accustomed to low and high intakes. The subjects might have been expected to retain an unusually high percentage of calcium because all had been living on low intakes for three months and some for many years. They did not. All retained less than 71 per cent, the mean retention found by Laszlo and Spencer (21) for a group of twenty-three normal subjects. Apparently retention on the day of infusion measures bone activity but does not measure stores.

On the day succeeding the test, all subjects lost less than before the test and the low-calcium subjects lost less in the urine than the other two. Possibly the calcium excretion on the day after the infusion is indicative of stores. Since a suppression in the urinary calcium of all six high-calcium subjects occurred at the beginning of the dietary experiment, possibly a sudden lowering of the calcium intake places a stress on the individual which permits a difference in urinary excretion due to stores to become evident. Since only four subjects were involved, these results may be fortuitous, but the subject is worth further investigation.

TABLE 4 The urinary calcium excretion of four young men infused with 475 mg. calcium

SUBJECT	16-DAY PERIOD PRECEDING	PRECEDING DAY	TEST DAY	SUCCEEDING DAY	RETENTION*
	Subjects Accustomed to a Low-Calcium Intake				
	mg./day	*mg.*	*mg.*	*mg.*	*%*
A	91	116	350	66	45
B	157	188	376	69	54
	Subjects Accustomed to a High-Calcium Intake				
W	135	178	421	101	40
Z	160	88	349	141	60

*The mean daily excretion in the sixteen-day period preceding the test was used in calculating the percentage retained.

Summary

Five young men accustomed to intakes of 350 to 750 mg. calcium per day and six accustomed to intakes of 1250 to 2000 mg. were placed on a balance study in which calcium intakes ranged from 175 to 253 mg. per day. No difference between the groups was noted in the calcium absorbed except for two men eighteen and nineteen years of age in the low-calcium group who absorbed large amounts. Growth may have been one factor which increased the percentages of calcium which they absorbed. The mean urinary loss of calcium by the low-calcium group was 91 mg. per day, while the high-calcium group lost 175 mg. during the first sixteen-day period.

Four of the men in the high-calcium and three in the low-calcium group continued on the low intake of the balance study for ninety-five days. During that time, the amount of calcium absorbed by five of the seven subjects increased from 4 to 8 per cent. With the exception of one subject whose initial loss was small, the mean urinary loss decreased by 20 mg. per day. Thus, the changes within the ninety-five days were small but indicated a trend toward increased retention.

There was no indication that a diet containing 180 to 230 mg. calcium was adequate.

The results of bone density tests and the urinary excretion of calcium on the day following an infusion of 475 mg. calcium suggested a difference in stores due to habitual calcium intake.

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The Home Economist and the Dietitian

The home economist and dietitian have entered the field of nutrition because of their inherent interest in people and in human welfare. The role of the home economist and dietitian has been concerned with human research studies, interpretation and application of research findings, and the promotion of nutrition education for all areas of the world.

The part of the home economist and dietitian has not been one of passive acceptance of information, but an active one of participation in human research studies. A glance at the annual report of home economics research in the experiment stations shows publication of studies dealing with: the nutritive value of various foodstuffs; the effect of processing, storage and cooking methods on the nutritive value of foods; nutritional status studies of various age groups; metabolism of minerals and vitamins by young children, adolescents and older women; utilization of nutrients by elderly women; energy requirements at different ages and for different activities; and dietary studies and surveys.

Interpretation and application of nutrition has been a major responsibility of the home economist and dietitian. Their professional interest is directed to service to people. Their training and experience qualify them to do their job which might be called the sociological side of nutrition.

Effective nutrition education for all people cannot be achieved by home economists and dietitians alone. The help and work of the biologic sciences, the behavioral sciences, education, agriculture, and the food industries are also needed. Achievement of such a goal probably needs what has been proposed elsewhere—a Nutrition Education Foundation.

Food and health are not only of concern to the family and to the nation, but are recognized as world problems, as witness the work of FAO, WHO, and UNICEF. Contributions to these world nutritional problems may surely be regarded as one of the factors in world peace.

One difficulty in fulfilling our role in the future is that in home economics and dietetics we face the same problem which is attracting national attention—the shortage of scientists. There are many in our profession who are pondering the problems in nutrition now and for the future. They are thinking about more and better training for the job, strengthening their scientific background, learning how to be more critical of their own work, and preparing themselves to cooperate more efficiently and effectively with others on the nutrition team.—*Abstracted from: "Role of the Home Economist and Dietitian" by E. N. Todhunter. Federation Proc. 17: 746, 1958.*

Effect of Low-Calcium Intake on Phosphorus Retention[1]

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A CALCIUM BALANCE study on seven young men extending over a period of three months offered an opportunity to observe also the metabolism of phosphorus. The object was to determine whether approximately 1100 mg. phosphorus per day was adequate when calcium intake was only 230 mg. The low intake of calcium was studied in an attempt to ascertain whether the human body can adapt to a low level if given time.

Procedure

The subjects were seven young men twenty-two through twenty-nine years of age; three had been accustomed to high intakes of phosphorus and calcium and four to moderate intakes of phosphorus and, with one exception, to low intakes of calcium. Their heights and weights varied considerably (1). Customary intakes were estimated from the calculation of one-week dietary records and histories.

The subjects were placed on a diet containing 1063 mg. phosphorus and 232 mg. calcium and were kept on the diet for ninety-five days. A sixteen-day metabolic period followed a four-day adjustment period and two more sixteen-day metabolic periods were placed at the middle and end of the dietary period. The middle period began on the forty-first day. The diet contained meat at both lunch and dinner but no milk or cheese. Feces, urine, and duplicates of the food were collected. Details of the diet and the collection of samples have been reported (1).

Aliquot portions of the food and feces were ashed in porcelain evaporating dishes at 500° C. for 20 hr. and the food was re-ashed; the urine was not ashed. The method of Simmons and Robertson (2) was used for the determination of phosphorus.

Results and Discussion

According to the calculation of a week's dietary record, the habitual intakes of phosphorus ranged from 900 to 2050 mg. per day (Table 1). According to dietary histories, these intakes were fairly representative for most of the men for the last ten to twelve years or longer. Subject B probably had been on a higher intake before 1951 and possibly on a slightly higher one up to eight months before the experiment. Subject A had a higher intake for two years when he was in the military service, a period which had ended eighteen months prior to the experiment. Subject Y probably consumed a little less than 1600 mg. phosphorus up to eight months before the experiment. The men were classified into two groups: one, composed of Subjects W, X, and Z was designated as high phosphorus; previous intakes of phosphorus ranged from 1800 to 2050 mg. per day and previous calcium intakes had also been high. The second group, Subjects A, B, C, and Y, was designated as moderate phosphorus; previous phosphorus intakes ranged from 900 to 1600 mg. Three subjects in the latter group had been living on low-calcium intakes but the fourth, Subject Y, was accustomed to high-calcium.

The mean phosphorus intake of all seven subjects during the three balance periods was 1043 mg. per day. The intakes ranged among the subjects from 928 mg. for Subject C, who was short and of a narrow build, up to 1134 mg. for Subject W, who ate the largest amounts of food permitted in unlimited quantities. The mean intake without Subject C, who because of his relatively small stature and weight was permitted to omit some foods from the basal diet, was 1063 mg. The mean calcium intake for six of the subjects was 232 mg. and that of the seventh, Subject C, was 188 mg.

A phosphorus intake of 1063 mg., the intake during the experiment, is probably high enough to cover the needs of most people when the calcium intake is as high as 800 mg. The Food and Nutrition Board of the National Research Council (3) recommends that phosphorus allowances be approxi-

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TABLE 1 Customary phosphorus intake and balance data for three sixteen-day metabolic periods

SUBJECT	PHOSPHORUS				
	Customary intake	Experimental intake from food*	Fecal excretion	Urinary excretion	Balance
Subjects Accustomed to a High-Phosphorus Diet					
	mg./day	*mg./day*	*mg./day*	*mg./day*	*mg./day*
Subject W	1900				
Period I		1115	271	972	−128
Period II		1156	258	875	+ 23
Period III		1130	280	933	− 83
Subject X	2050				
Period I		1066	251	946	−131
Period II		1116	234	982	−100
Period III		1106	239	958	− 91
Subject Z	1800				
Period I		1006	235	866	− 95
Period II		1030	230	848	− 48
Period III		1003	210	830†	− 37
Mean					
Period I		1062	252	928	−118
Period II		1101	241	902	− 42
Period III		1080	243	907	− 70
Subjects Accustomed to a Moderate-Phosphorus Diet					
Subject Y	1600				
Period I		1079	231	782†	+ 66
Period II		1053	286	746	+ 21
Period III		1094	259	826	+ 9
Subject A	1400				
Period I		1018	245	717	+ 56
Period II		1018	237	756	+ 25
Period III		1016	238	834	− 56
Subject B	900				
Period I		1042	277	744	+ 21
Period II		1030	236	805†	− 11
Period III		1049	266	826	− 43
Subject C	950				
Period I		967	249	687†	+ 31
Period II		953‡	218	736	− 1
Period III		864‡	184	717	− 37
Mean					
Period I		1026	250	732	+ 44
Period II		1014	244	761	+ 9
Period III		1006	237	801	− 32

*Mean calcium intake was 232. gm. per day.

†Urinary values were based on a three-day composite for one of the four four-day collection periods.

‡Subject C was allowed to omit certain foods in the basal diet and ate less of the food allowed *ad libitum* than the other subjects. In addition, in Period III, he omitted certain foods high in roughage.

mately one and one-half times those of calcium, or 1200 mg. This allowance is set high enough for a margin of safety; the requirement of most individuals is, of course, lower.

All subjects who had been accustomed to a high-phosphorus intake were in negative balance during the first metabolic period but improved with the passage of time. For some unexplained reason, Subject W retained unusually well in the second period. For all three subjects, the greatest improvement occurred before the second metabolic period. Although they improved with time, all were still in negative balance in the third period. Subject Z lost 37 mg. in the third metabolic period, a loss similar to that of most of the members of the moderate-phosphorus group. Subjects X and W were losing 91 and 83 mg. respectively. Possibly if they had continued on the diet longer, their losses would have decreased further. Apparently adjustment following a lowering of the phosphorus intake was rapid at first and then slow.

All subjects who had been accustomed to moderate intakes retained phosphorus in the first metabolic period. Subject Y, who retained the most, was the only one accustomed to a high-calcium intake. In the second metabolic period, all retained less than in the first period; still less was retained in the third metabolic period. All subjects except Y ended in negative balance. Probably he, too, would have gone into negative balance had he remained longer on the diet. Apparently the adjustment of phosphorus retention following a reduction in the calcium intake to an extremely low level is gradual and even. Most of the changes were caused by alterations in the excretion of urinary phosphorus.

It is interesting to note that the changes in the size of retention in the two groups went in opposite directions and both reached negative values in the last metabolic period. One may speculate that all individuals in both groups would have come to a loss of 30 to 60 mg. per day had the experiment continued until the losses reached a plateau.

When bone salts are resorbed, a little more than twice as much by weight of calcium as phosphorus is released if the formula for bone salts is $Ca_{10}(PO_4)_6(OH)_2$. The mean calcium loss by the seven men in the last metabolic period was 77 mg. per day and the mean loss of phosphorus was 48 mg. This suggests that the rate of resorption of bone salts was exceeding the rate of deposition. This may have occurred because there was insufficient calcium for a normal rate of deposition of phosphorus.

All subjects absorbed about the same percentages of phosphorus; the range was from 75 to 78 per cent. The percentage did not increase with the passage of time. That adaptation owing to increased absorption of phosphorus might have occurred had the experiment been continued for more than three months is unlikely. Phosphorus is more readily absorbed than calcium, and a delayed adaptation in absorption is doubtful. Delayed changes in apparent absorption owing to changes in endogenous fecal calcium would not occur because that fraction of the fecal phosphorus responds immediately to a change in intake.

An immediate adjustment in the endogenous fecal phosphorus of cattle was found by Comar and Wasserman (4).

Conclusion

The findings lead to the conclusion that 1063 mg. phosphorus is inadequate when the diet contains only 232 mg. calcium. Raising the calcium intake is proposed as a better way to achieve phosphorus retention than raising the intake of phosphorus. The remote possibility must be recognized that if the men had continued longer on the diet, they might have begun to retain calcium and might then have retained phosphorus, too.

Summary

Seven young men, three accustomed to phosphorus intakes of 1800 to 2050 mg. per day and four to intakes of 900 to 1600, were placed on a moderate intake of phosphorus for ninety-five days. Balance periods of sixteen days were conducted at the beginning, middle, and end of the dietary period.

During the ninety-five days, the mean phosphorus intake of six of the seven subjects was 1063 mg. per day and the calcium intake, 232 mg. For the seventh subject, who was much smaller than the others, intakes were 928 mg. and 188 mg., respectively. The percentage of phosphorus absorbed by the seven subjects was constant at from 75 to 78.

The three men accustomed to high-phosphorus intakes lost phosphorus during the first metabolic period, continued to lose small amounts in the second and third periods, and ended with a mean loss of 70 mg. per day. The four men accustomed to intakes in the neighborhood of the one used in the experiment retained phosphorus at first, but the balances gradually changed to negative except for one subject whose retention steadily decreased but did not become negative during the experimental period.

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A Letter from New Zealand

Greetings from New Zealand, "The World in Miniature," for indeed that is what it is. Words can hardly describe the beauties of nature. One can see in such short distances here, the beautiful scenes we prize but must travel to enjoy.

My work has been most satisfying. I have spent considerable time at the University of Otago, Dunedin, where I have enjoyed contacts with students and have been privileged to enter into the academic and social life. I have visited most of the hospitals where there are dietitians and have spent some time at the four hospitals offering training courses for dietetic interns. In August, the senior dietitians came to Wellington for a refresher course. I was most impressed by their earnestness and by the "colossal" job they are doing—there are only 51 active dietitians for an 11,000-bed hospital population!

Many of the problems of the dietary departments are similar to ours, but there are a few striking differences, too. In some ways it would seem that their problems are simpler because of the philosophy of the welfare state—all patients, except those on modified diets, are given the same menu. However, New Zealanders like food seven times a day, which complicates the problems of the dietary departments. In addition, many of the dietitians supervise several hospitals which operate under the same hospital board.

Because of the rapidly growing population and corresponding demand for hospital beds, there is an extensive building and remodeling program of hospitals and nursing homes being carried on. It has been stimulating to work with the boards, dietitians, and architects.

One interesting project is what is called "meals on wheels." Many of the hospitals send out a mid-day hot meal to a selected group of older people who need help. These meals are distributed by volunteers from various women's organizations. I had an opportunity to go on one of these "rounds" and was most impressed by the appreciation shown by these recipients of this service.

The hospitality of the New Zealanders has been wonderful. Dietitians, Home Science Alumnae, and University Federation members have not only opened their hearts to me but their lovely homes. I feel greatly honored, too, in having been made an honorary member of the New Zealand Dietetic Association.—*E. Evelyn Smith, U.S. Fulbright Scholar, Wellington, New Zealand.*

Supplementary Relationships of Proteins[1]

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THE SUPPLEMENTARY properties of proteins are well known; however, the extensions of basic principles to practical applications can easily result in misinterpretations of the protein values of food mixtures. These misinterpretations arise from the assumption that a biologic value which has been determined with a protein (or a mixture of proteins) as the sole source of protein in a test diet reflects the usefulness of that protein (or mixture) in a mixed diet. Actually, the dietary value of any protein depends on the extent to which its amino acids can make the diet complete with respect to meeting the requirements for amino acids. Thus, the dietary value of a protein depends on the composition of the other proteins with which it is used.

Cereal products, particularly, have been shown to have improved protein quality when supplemented with proteins of animal origin or with amino acids (1–5). The addition of an amino acid to a food deficient in that amino acid improves the food and, to a certain extent, the entire diet if that food is relied on as a source of protein. However, such enrichment does not magically convert an unbalanced protein into one of high quality, as is often claimed. High quality proteins, in addition to supplying a balanced assortment of amino acids, provide enough of the essential amino acids to compensate for the deficiencies of less complete proteins in the diet, thereby improving the quality of the entire mixture. In this respect, many of the enriched blends fail. They support growth when used at a sufficiently high level as the sole source of protein, but their inadequacies become apparent when supplementary properties of relatively small amounts are considered.

Foods also differ in the extent to which they are digested and absorbed, and this must be taken into account in estimating their contributions to the diet. The rate of release of the individual amino acids is important, since all of the essential amino acids must be present in the blood stream simultaneously for effective use (6–8). Amino acids which are digested from protein more rapidly (or more slowly) than the others may be absorbed and metabolized without a complete assortment of amino acids becoming available at any one time in the blood stream. Free amino acids particularly, can be absorbed readily, and enrichment of slowly or incompletely digested proteins with pure amino acids may be much less effective than calculations of the total potential supply of amino acids would indicate. Other investigators have shown that mixtures of amino acids are less effective supplements than proteins of similar composition (7–11).

In view of these factors which influence protein supplementations, biologic testing which takes into account the composition of the several foods of the diet seems to be essential before valid nutritional claims for a product can be made. Biologic studies of a blended cereal protein claimed to be a "complete" protein source and of supplemented cereal products illustrate the need for caution in predicting the dietary value of such products. The following experiments were designed to compare animal protein and blended cereal protein qualities both as to the sole source of protein and as supplements to wheat flour protein.

Experimental Plan

DIETS

To compare the growth-promoting properties of each of three different proteins, beef, casein, and a blended cereal protein concentrate were fed as the sole source of protein or as supplements to the proteins of white bread. The beef protein was provided as ground, lean meat, trimmed from U.S. Good

[1] Received for publication August 6, 1958.

rib roast cooked in an oven at 325°F. to an internal temperature of 160°F. (medium-well done). Vitamin-free casein was used in the casein diet. The cereal protein blend was a commercial product containing defatted soybean meal, wheat germ, and other wheat fractions mixed in proportions which gave a 26 per cent protein level.

These proteins were used in various combinations in ten experimental diets formulated as shown in Table 1 and supplying protein at either a 6.5 per cent level or a 10 per cent level; fat at 10 per cent level; and quantities of minerals and vitamins considered to be adequate for growing rats. Beef fat was added to the non-beef diets in an amount equivalent to the fat contained in beef rations.

PROCEDURE

To permit a study of the supplementary relationships among these protein sources, a randomized block design using 100 male rats weighing 40 to 45 gm. was used. The rats were divided into ten different groups based on differences in the initial body weights. Within each group of ten rats, the diets were randomly assigned. The rats were individually caged and supplied with the appropriate diet and water *ad libitum* for six weeks. Fresh diet was supplied daily, and all unbeaten and wasted food was recovered and saved to permit accurate records of food consumption. The animals were weighed weekly.

Results and Discussion

The average growth weights and weight gains of the rats fed the various experimental diets are shown in Figures 1, 2, and 3. These figures show the actual gains, but adjustment of these gains to compensate for differences in food intake (covariance analysis) did not change the rank of these means, as shown in Table 2.

When fed as the sole source of protein in the 6.5 per cent protein diets, beef gave a significantly ($p < .05$) better growth response than either the blended cereal protein or casein; and the blended cereal protein was significantly ($p < .05$) better than casein (Fig. 1). On the basis of these latter two groups alone, it might be assumed that the cereal protein was nutritionally equivalent to an animal protein, i.e., casein. However, when compared with beef, or when these proteins are used as supplements to white bread, an entirely different interpretation is necessary. As supplements, both the casein and beef significantly ($p < .05$) excelled the blended cereal protein, as shown in Figure 2.

This superiority of casein and beef was further confirmed by the experiments using a 10 per cent protein level (Fig. 3), in which bread supplemented with either of these two proteins promoted much faster growth than the comparable groups getting bread and blended cereal protein. In this case, the growth of the rats fed bread and beef exceeded that of animals fed bread and casein. The cereal blend

TABLE 1 **Formulation of the experimental diets***

DIET NUMBER	CEREAL PROTEIN CONCENTRATE	LEAN ROAST BEEF	CASEIN	SPECIAL BREAD	CONTROL BREAD	BEEF FAT†	COTTONSEED OIL	MINERAL MIXTURE‡	CELLU FLOUR	CORN STARCH	WHEAT GERM OIL#	VITAMIN A AND D FEEDING OIL¶	SUCROSE
					6.5 Per Cent Protein Diets								
	gm./100 gm.	*gm./100 gm.*	*gm./100 gm.*	*gm./100 gm.*	*gm./100 gm.*	*gm./100 gm.*	*gm./100 gm.*	*gm./100 gm.*	*gm./100 gm.*	*gm./100 gm.*	*gm./100 gm.*	*gm./100 gm.*	*gm./100 gm.*
1	22.4	—	—	—	—	2.0	6.0	3.3	1.6	20.0	2.0	1.0	41.7
2	—	8.7	—	—	—	—	8.0	3.8	2.0	20.0	2.0	1.0	54.5
3	—	—	6.8	—	—	2.0	8.0	4.0	2.0	20.0	2.0	1.0	54.2
4	—	—	—	41.5	—	0.6	7.6	3.0	1.9	20.0	2.0	1.0	22.4
5	—	2.7	—	—	30.0	—	8.2	3.6	2.0	20.0	2.0	1.0	30.5
6	—	—	2.0	—	30.0	0.6	8.2	3.6	2.0	20.0	2.0	1.0	30.6
					10 Per Cent Protein Diets								
7	—	—	—	—	66.6	1.0	6.3	3.0	1.8	18.3	2.0	1.0	—
8	—	—	—	63.8	—	1.0	6.2	2.3	1.9	20.0	2.0	1.0	1.8
9	—	3.1	—	—	45.9	—	7.1	3.4	1.9	20.0	2.0	1.0	15.6
10	—	—	3.2	—	45.9	1.0	7.1	3.5	1.9	20.0	2.0	1.0	14.5

*B vitamins were dissolved in 95 per cent ethyl alcohol and supplied in a quantity to provide the following amounts of each vitamin per kilogram of diet; choline chloride, 1 gm.; thiamine, 7 mg.; riboflavin, 7 mg.; pantothenic acid, 20 mg.; niacin, 30 mg.; para-aminobenzoic acid, 30 mg.; and pyridoxine, 7 mg. All data are on a dry matter basis.

†In diets without lean beef, beef fat was added to provide the same level of beef fat as in the beef diets. The remaining fat in all diets consisted of cottonseed oil.

‡From Jones and Foster (12).

#Contained not less than 2 I.U. vitamin E per gram.

¶Contained 2250 U.S.P. units vitamin A and 300 I.U. vitamin D_3.

was much less effective than either casein or beef as a supplement to the bread protein, even though it appeared to be better than casein when fed as the sole source of protein at a 6.5 per cent level.

In similar tests in our laboratory, the protein qualities of a white bread, a widely advertised "protein" bread from the same bakery, and "protein" bread plus beef were tested with rats fed a diet at a 10 per cent protein level. After six weeks, gains on the white bread diet averaged 21 gm.; gains with "protein" bread were better, averaging 90 gm., but were far less than the 165 gm. for the "protein" bread plus beef.

Bubl (4) has also shown that a cereal food promoted on the basis of its protein quality failed to maintain animals when fed at a level to supply 9 per cent protein in the diets and would only support poor growth when supplemented with skim milk solids. The same cereal food, when supplemented with 1 per cent lysine, gave growth equivalent to that obtained with casein. Growth is known to be sub-optimal when casein is fed at a 9 per cent protein level.

Supplementary relationships, rather than individual protein qualities, are the important factors in dietary considerations. Biologic values determined with a single protein in a diet, while giving useful information for fundamental research, can be misleading if they are used indiscriminately in promoting proteins as adjuncts to diets. This is well recognized by nutritionists and dietitians, but it is a point which can be confusing to others who attempt to understand this field.

This has been clearly pointed out by Bender (5), who states in referring to improvements of bread by amino acid enrichment: "These claims are gross exaggerations . . ." He asserts that "the error seems to have arisen from a confusion of the two terms, 'protein efficiency ratio' and 'biological value.' " Regardless of the nature of the error in logic, it is obvious from Figures 1, 2, and 3, and from the work of Bubl, that certain of the formulated products are not of the intended protein quality. Friedman has also called attention to the need for differentiating between the conventional estimations of protein quality and the supplementary protein values of food. He states (13): ". . . We should not lose sight of the fact that even when a plant protein food has been improved so that it can be ranked with milk, meat, and eggs, it still may not have the supplementary value for other unimproved plant sources, and therefore cannot always make the same contribution to the protein of the diet as can the high-quality animal proteins."

The quantity of protein in the diet determines, to a considerable extent, the nature of the response to the protein. Low dietary levels of moderate quality

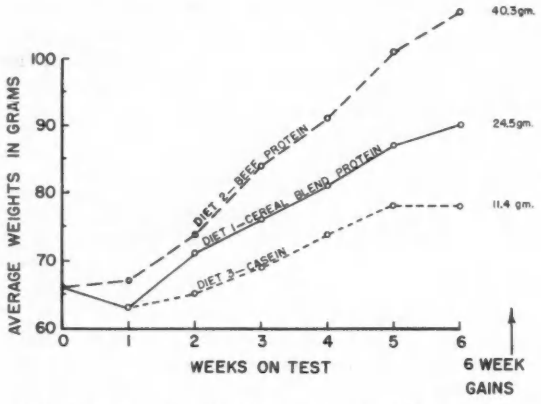

FIG. 1. *Gains of rats fed experimental diets containing 6.5 per cent protein.*

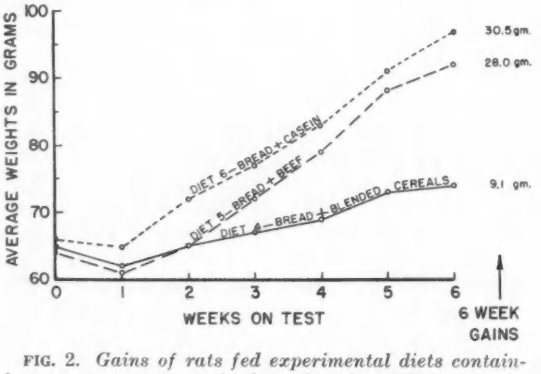

FIG. 2. *Gains of rats fed experimental diets containing 6.5 per cent protein from bread supplements.*

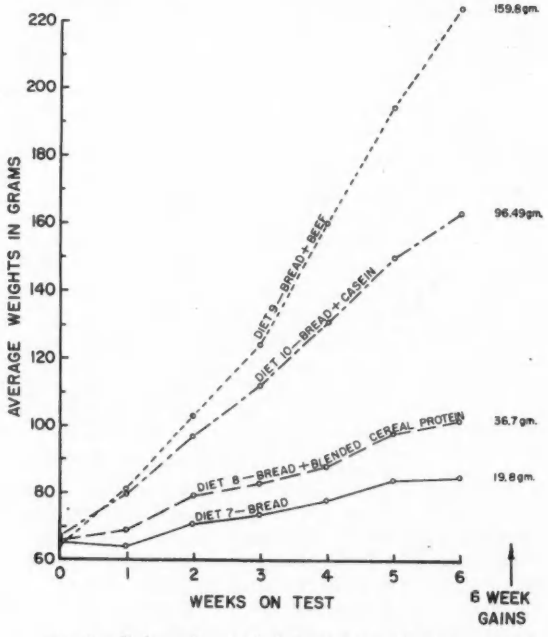

FIG. 3. *Gains of rats fed experimental diets containing 10 per cent protein from bread and supplements.*

TABLE 2 Mean gains for a six-week period, adjusted for protein intakes

DIET NUMBER	SOURCE OF PROTEIN	MEAN PROTEIN INTAKE	MEAN GAIN	ADJUSTED MEAN GAIN
	6.5 Per Cent Protein Diets			
		gm.	*gm.*	*gm.*
1	cereal blend	19.9	24.5	26.0*
2	beef	22.2	40.3	33.4*
3	casein	18.1	11.4	18.2
4	bread and cereal blend	18.8	9.1	14.2
5	bread and beef	22.2	28.0	22.6*
6	bread and casein	21.0	30.5	27.7
	10 Per Cent Protein Diets			
7	bread	31.9	19.8	41.3
8	bread and cereal blend	35.6	36.7	50.3
9	bread and beef	53.0	159.8	136.9**
10	bread and casein	47.8	96.7	84.6*

* and ** When Diets 1 and 2 are compared with Diet 3, Diets 5 and 6 with Diet 4, and Diets 8, 9, and 10 with Diet 7, the single asterisk designates statistical significance at the 5 per cent level and the double asterisk at the 1 per cent level.

proteins do not support good growth or maintain nitrogen balance; large quantities may. Thus, in the present studies with bread plus casein, 6.5 per cent protein resulted in a gain of only 30.5 gm.; but 10 per cent more than tripled the rate of growth. Larger quantities would have undoubtedly resulted in still better gains. Thus, as the quantity of protein in the diet is increased, quality becomes proportionately less critical and differences between the dietary influences of good and poor proteins appear to be less marked. However, if the protein is of too poor a quality, increases in quantity cannot compensate for the deficiencies, no matter how much is supplied. Animals fed diets containing such proteins show dramatic improvements when supplemented with good protein. Furthermore, dietaries which already contain adequate protein are not greatly improved by increases in quality or quantity. In practical high-protein diets, protein quality is not critical; low-protein diets, frequently of moderate or low protein quality, require additions of high quality protein for effective supplementation.

Many "pseudo-scientific" claims of merit for specific proteins or protein blends are appearing and must be evaluated by nutritionists. In considering all of this material, it is important to bear in mind that inferences based on protein qualities obtained under one set of circumstances may be completely erroneous, as the above data indicate, and that a "balancing" of the amino acid content of some deficient protein by the addition of a calculated amount of limiting amino acid may be much less effective than anticipated. The difficulties which the many investigators studying amino acid balance and imbalance have had in obtaining optimum growth emphasize this point.

Summary

Rat growth tests indicate a blend of cereal protein to be a less effective supplement to the protein of bread than either casein or beef. When fed as the sole source of protein at a 6.5 per cent level, casein did not support growth as well as the cereal blend or beef, the respective six-week gains being 11.4, 24.5, and 40.3 gm. However, when 3.75 per cent levels of casein or beef proteins were fed along with equal amounts of protein from bread, better growth was promoted than when the cereal blend was the supplement, the respective gains being 30.5, 20.0, and 9.1 gm. Also, at a 10 per cent dietary protein level, beef and casein were superior to the cereal blend as supplements to bread protein, the respective gains being 159.8, 96.5, and 36.7 gm. The gain with bread alone was 18.8 gm.

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Bacterial Growth in Potato and Turkey Salads[1]

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POTATO AND MEAT salads are usually looked on with suspicion in connection with food poisoning outbreaks; such salads are known to have caused trouble many times.

In the process of their preparation, the basic ingredients—the potatoes and the meat—are manipulated by hand and the chances for contamination from hands, utensils, and cutting boards are great. If, in addition, these ingredients should be held at temperatures favorable to bacterial growth for hours after they are handled, the inoculum would be given an excellent chance for profuse multiplication.

Lewis, Weiser, and Winter (1) studied bacterial growth in chicken salads and found that there was a certain amount of unavoidable contamination during the boning and cutting. They also found that under favorable temperature conditions, this amount of natural inoculum resulted in bacterial counts as great as when a large amount of inoculum had been added to the meat. The *p*H of the finished salads was 5.5; final counts were high in the salads subjected to temperature conditions favorable to bacterial growth.

The purpose of this investigation was to study the effect on *p*H and bacterial counts in potato and turkey salads of holding some of the basic ingredients for several hours at room temperature following inoculation and before other ingredients were added; of marinating these basic ingredients following inoculation; and of varying the formulas used in preparing the salads.

The general plan was as follows: to study the effect of holding, half of the material was inoculated with the test organism and allowed to remain at room temperature for several hours; the other half was not held following inoculation. To study the effect of marinating, half of the samples were mixed with a marinade immediately following inoculation; the other half was not marinated. To study the effect of ingredients, the salads were tested at two levels of mayonnaise and other selected ingredients, which included: for the potato salads, egg and pickle; and for the turkey salads, celery and pickle.

Experimental Procedure

POTATO SALADS

The plan of the experiments with potato salad is shown in Diagram 1. To study the effect of holding, half of the inoculated potatoes was allowed to remain at 30°C. for 3 hr.; the other half was immediately subjected to further treatment in that the potatoes were mixed with one or all of the remaining ingredients. Both the "hold" and "no-hold" groups were further subdivided, with half of each group marinated for 1 hr. and the other half left unmarinated and simply mixed with the mayonnaise and other variables, which were egg and pickle. All samples were tested at two levels of mayonnaise; and at each level of mayonnaise, at two levels of egg, two levels of pickle, and a combination of low egg and high pickle.

TURKEY SALADS

In Diagram 2 is shown the plan of study for the turkey salads. The turkey, egg, and celery (high and low levels) were autoclaved and cooled before inoculation. To study the effect of holding and marinating, the inoculated turkey-egg-celery mixtures were subjected to the treatment as described for the inoculated potato samples. All samples were tested at two levels of mayonnaise and two levels of pickle.

PREPARATION OF INGREDIENTS

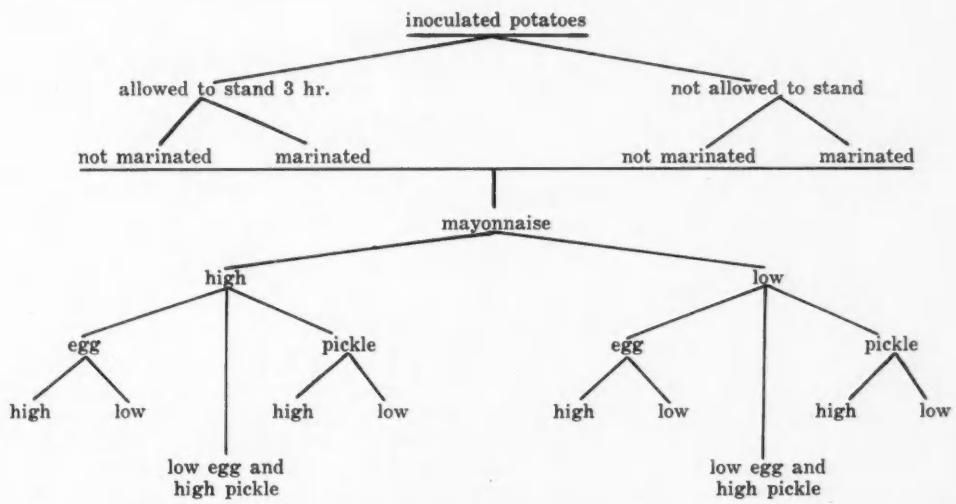
Ingredients sufficient for the entire experiment were purchased.

Potatoes. Formulas for the potato salads are given in Table 1. The potatoes were peeled in an automatic

[1] Received for publication September 12, 1958.

[2] The authors acknowledge the contribution of Corrine W. Lynch, graduate student in the Laboratory of Bacteriology, and of the palatability judges.

DIAGRAM I—PLAN OF STUDY WITH POTATO SALADS



potato peeler, eyed, and sliced into ½-in. pieces which were then diced on a julienne cutter. The cubes were distributed over the bottom and up the sides of a colander to a depth of not over 3 in. and placed in a steamer for 20 min. They were covered with a sterile cloth immediately on removal from the steamer.

All utensils used for the preparation of the materials for the potato salads were sterilized in hot water.

Turkeys. In Table 2 are given the formulas used for turkey salads. Large, frozen turkeys were used. The turkeys were defrosted, disjointed, and roasted at 325°F. until tender; cooled; boned; and diced into ¼-in. cubes. Meat sufficient for the entire experiment was prepared and mixed, and portions sufficient for each day's samples were wrapped in aluminum foil and freezer-stored until the mixtures were made up.

Eggs. Fresh eggs were prepared for each group of samples. Eggs at room temperature were placed in a colander and steamed for 15 min. The cooked eggs were cooled under running water for 5 min., then allowed to stand in cold water for an additional 5 min., shelled, and rinsed. They were sliced crossways and lengthways in an egg slicer, placed in a bowl, and finely chopped, using a pastry blender, covered with aluminum foil, and refrigerated until used.

Celery. The celery stalks were thoroughly cleaned and then cut into ¼-in. cubes.

French dressing. The formula was ½ c. oil, ¼ c. vinegar, and ¼ tsp. sugar for the potato salad. The sugar was increased to 1 tsp. for the turkey salad. One hundred fifty ml. French dressing were placed in each of four Erlenmeyer flasks and sent to the Laboratory of Bacteriology for sterilization. One flask was used each week to marinate the samples.

TABLE 1 Formulas for making potato salad*

TYPE OF SALAD	POTATOES (pH, 6.30)	EGG (pH, 8.55)	PICKLE (pH, 3.00)	MAYONNAISE (pH, 4.10)
High-Mayonnaise Samples				
	gm.	*gm.*	*gm.*	*gm.*
Plain	80.0	—	—	20†
High egg	72.5	7.5	—	20†
Low egg	76.3	3.7	—	20†
High pickle	74.0	—	6	20†
Low pickle	77.0	—	3	20†
Low egg, high pickle	70.3	3.7	6	20†
Low-Mayonnaise Samples				
Plain	90.0	—	—	10‡
High egg	82.5	7.5	—	10‡
Low egg	86.3	3.7	—	10‡
High pickle	84.0	—	6	10‡
Low pickle	87.0	—	3	10‡
Low egg, high pickle	80.3	3.7	6	10‡

*For palatability tests, 1 gm. salt and 0.2 gm. onion powder per 100 gm. salad were added.

†In marinated samples, 13.3 gm. mayonnaise and 6.7 gm. French dressing ($\frac{pH}{}$, 3.58) were used.

‡In marinated samples, 6.7 gm. mayonnaise and 3.3 gm. French dressing (pH, 3.58) were used.

DIAGRAM 2—PLAN OF STUDY WITH TURKEY SALADS

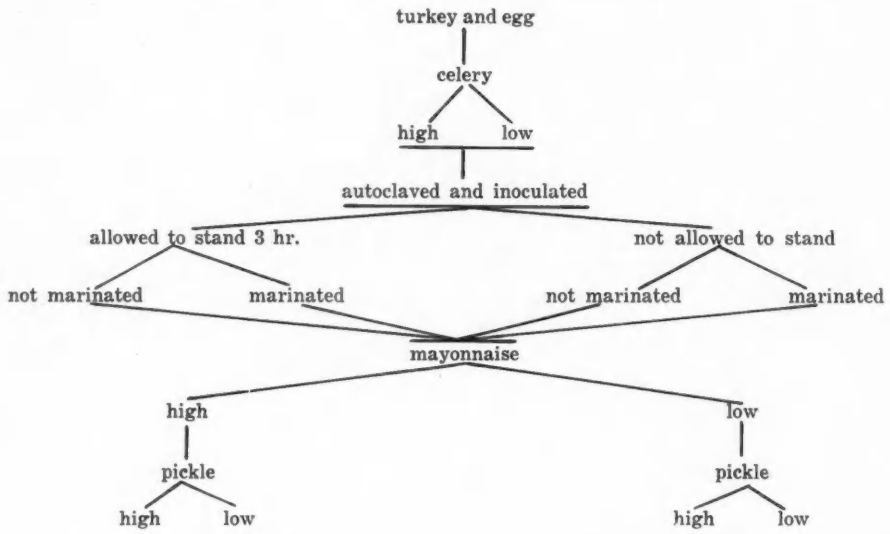


TABLE 2 Formulas for making turkey salads*

TYPE OF SALAD	TURKEY (pH, 6.20)	EGG (pH, 8.55)	CELERY† (pH, 5.92)	PICKLE (pH, 3.00)	MAYONNAISE (pH, 4.10)
			High-Mayonnaise Samples		
	gm.	*gm.*	*gm.*	*gm.*	*gm.*
High celery	30.0	10.0	40	—	20†
Low celery	45.0	15.0	20	—	20†
High celery, high pickle	25.5	8.5	40	6	20†
High celery, low pickle	27.8	9.2	40	3	20†
Low celery, high pickle	40.5	13.5	20	6	20†
Low celery, low pickle	42.8	14.2	20	3	20†
			Low-Mayonnaise Samples		
High celery	33.8	11.2	45	—	10‡
Low celery	45.0	15.0	30	—	10‡
High celery, high pickle	29.3	9.7	45	6	10‡
High celery, low pickle	31.5	10.5	45	3	10‡
Low celery, high pickle	40.5	13.5	30	6	10‡
Low celery, low pickle	42.8	14.2	30	3	10‡

*For palatability tests, 1 gm. salt and 0.2 gm. onion powder per 100 gm. salad were added.

†In marinated samples, 13.3 gm. mayonnaise and 6.7 gm. French dressing (pH, 3.58) were used.

‡In marinated samples, 6.7 gm. mayonnaise and 3.3 gm. French dressing (pH, 3.58) were used.

Mayonnaise and pickles. Commercially prepared products were used.[3]

PREPARATION OF SAMPLES FOR INOCULATION

The levels of ingredients were determined on the basis of a preliminary palatability study. The formulas are presented in Tables 1 and 2.

For the preparation of the potato salads, the diced cooked potatoes were placed in a 600-ml. beaker, using a long-handled spoon; covered with aluminum foil; and stored in the refrigerator until sent to the Laboratory of Bacteriology.

The mayonnaise and pickle, if used, were placed in the bottom of a 3-qt. polyethylene bag; the bag was folded over twice and the egg placed in the bag; this way it did not come in contact with the mayonnaise or pickle; the top was fastened with a rubber band.

In the turkey salads, preliminary bacteriologic tests on samples using raw celery indicated contamination to such an extent as to necessitate autoclaving the celery as well as the turkey. The turkey, egg, and celery, in that order, were placed in a 600-ml. beaker. The autoclaved turkey needed the moisture from the celery; therefore, the celery was placed on top. The beakers were covered with aluminum foil and stored in the refrigerator until they were sent to the Laboratory of Bacteriology.

The mayonnaise and pickle, if used, were placed

[3]Hellman's mayonnaise and S & H sweet pickle relish.

in a polyethylene bag. A side sample used to determine the *p*H was prepared following the same procedure.

PALATABILITY

Two hundred-gm. samples were prepared for palatability and *p*H tests. The unmarinated and marinated samples were tested on separate days. For the palatability tests for all samples, 1 gm. salt and 0.2 gm. onion powder per 100 gm. mixture were added.

Potato salad, not marinated. The ingredients were placed in a 600-ml. beaker, thoroughly combined, covered with aluminum foil, and refrigerated overnight.

Potato salad, marinated. The potato was placed in a 600-ml. beaker, the marinade was added and mixed with the potato; the mixture was covered with aluminum foil and allowed to stand for 1 hr.; all other ingredients were added, thoroughly combined, covered with aluminum foil, and refrigerated overnight.

Turkey salad, not marinated. Since preliminary palatability samples showed excess moisture when the celery came in contact with the mayonnaise, the celery was placed on the bottom of a 600-ml. beaker; added were turkey, egg, mayonnaise, and seasoning, in that order. When pickle was added, it was placed in an indentation in the mayonnaise in such a manner that it did not leak onto the ingredients below. The samples were covered with aluminum foil, refrigerated overnight, and mixed just before serving.

Turkey salad, marinated. The turkey, egg, and seasoning were placed in a 600-ml. beaker, mixed, covered, and refrigerated overnight. The celery, mayonnaise, and pickle, in that order, were placed in

TABLE 3 **Bacterial growth and pH of forty-eight potato salad mixtures**

SALAD FORMULA	INOCULATED POTATOES WHICH STOOD 3 HR. BEFORE REMAINING INGREDIENTS WERE ADDED				INOCULATED POTATOES NOT ALLOWED TO STAND BEFORE REMAINING INGREDIENTS WERE ADDED			
	Not marinated		Marinated		Not marinated		Marinated	
	pH	Log final count per gram	pH	Log final count per gram	pH	Log final count per gram	pH	Log final count per gram
High mayonnaise								
Test 1	5.21	8.34	4.79	5.90	5.31	7.89	4.95	4.71
Test 2	5.01	8.62	4.70	6.03	5.27	8.49	4.85	4.52
High mayonnaise, high egg								
Test 1	5.46	8.13	5.01	6.88	5.60	7.66	5.26	6.09
Test 2	5.30	9.08	5.02	7.37	5.61	8.95	5.21	5.07
High mayonnaise, low egg								
Test 1	5.34	7.79	5.11	6.75	5.45	7.27	5.02	5.37
Test 2	5.23	9.10	4.95	6.77	5.31	8.78	5.03	5.20
High mayonnaise, high pickle								
Test 1	4.60	5.28	4.60	3.51	4.61	4.29	4.60	4.12
Test 2	4.61	5.36	4.50	4.56	4.61	5.11	4.51	<3.5
High mayonnaise, low pickle								
Test 1	4.92	5.52	4.70	3.23	4.91	5.94	4.72	3.36
Test 2	4.90	6.17	4.60	4.91	4.81	5.83	4.71	3.63
High mayonnaise, low egg, high pickle								
Test 1	4.90	5.74	4.51	3.62	4.82	6.37	4.67	4.25
Test 2	4.82	6.05	4.55	3.76	4.95	6.03	4.55	<3.50
Low mayonnaise								
Test 1	5.51	9.10	5.15	8.29	5.71	8.38	5.05	7.44
Test 2	5.48	9.35	5.10	8.37	5.56	9.05	5.10	8.01
Low mayonnaise, high egg								
Test 1	5.91	8.85	5.41	8.59	6.00	8.85	5.59	8.02
Test 2	5.70	9.32	5.25	9.15	5.75	9.31	5.35	9.09
Low mayonnaise, low egg								
Test 1	5.74	8.80	5.25	8.49	5.85	8.72	5.42	7.43
Test 2	5.73	9.35	5.22	9.17	5.65	9.07	5.31	8.32
Low mayonnaise, high pickle								
Test 1	4.69	6.61	4.75	5.33	4.69	6.39	4.79	3.26
Test 2	4.74	6.00	4.69	6.43	4.72	6.44	4.66	<4.5
Low mayonnaise, low pickle								
Test 1	5.21	7.79	4.95	6.05	5.11	7.56	4.90	6.49
Test 2	5.10	8.57	4.85	7.03	5.10	8.22	4.85	5.31
Low mayonnaise, low egg, high pickle								
Test 1	5.02	6.47	4.82	4.76	5.00	6.07	4.66	5.35
Test 2	4.95	7.65	4.75	5.23	5.00	6.72	4.78	5.64

a 250-ml. beaker, covered, and refrigerated overnight. The marinade was added to the turkey mixture, combined well, and allowed to stand 1 hr.; the other ingredients were added, mixed well, and the salad served immediately.

A No. 40 scoop was used to place the samples on numbered plates. Six samples were rated by each judge at one sitting. The salads were rated as "very acceptable," "acceptable," and "unacceptable." The order of testing was randomized. The panel of ten judges were members of the Departments of Institution Management, and Food and Nutrition.

BACTERIOLOGIC PROCEDURES

The test organism was *Micrococcus pyogenes* var. *aureus* S209. It was carried in meat infusion broth. Transfers were made weekly, 24 hr. before the culture was to be used for inoculation. At this time, a new parental culture was also made for the following week. The culture was refrigerated when not in use.

All dilutions of the culture for inoculation were made in sterile 99-ml. distilled water blanks. Plates of 10^{-7} dilution were prepared simultaneously to check the amount of bacterial growth of the inoculum.

The potatoes were not autoclaved. The turkey mixtures were autoclaved for 1 hr. at 121°C. and were cooled to room temperature before inoculation.

An inoculum of 10 ml. of a 10^{-4} dilution of the culture was added to all samples. The inoculated mixture contained 5×10^3 to 1×10^4 cells per gram.

The inoculated samples were divided into two groups, one of which was allowed to stand for 3 hr. at 30°C. before further treatment. Each of these groups was further divided into two. One was mixed with marinade and allowed to stand for 1 hr., while the other was added directly to polyethylene bags containing the mayonnaise and other remaining ingredients. The samples were mixed by manipulation for at least 30 seconds, or longer if necessary.

Following incubation at 30°C. for 20 hr., the samples were diluted with twice their volume of water. The potatoes were Waring-blended for 1 min. and the turkey mixtures for 2 min. Dilutions for plating were made from the resulting mixtures.

The plating medium was meat infusion agar. Unautoclaved samples were plated on medium containing Actidione[4], a fungicide, in concentrations of 100 mcg. per milliliter of medium.

In preliminary tests, concentrations of even twice this amount were tested with *Micrococcus pyogenes* var. *aureus* S209 and found to be noninhibitory to this organism.

The plates were incubated at 37°C. for 20 hr.

[4] Upjohn Company.

Results

POTATO SALADS

The *p*H values and bacterial counts of forty-eight potato salad mixtures are given in Table 3. The palatability scores are given in Table 4.

Effect of holding. In general, holding the inoculated potatoes at 30°C. for 3 hr. following inoculation had no pronounced effect on the final bacterial counts.

Effect of marinating. The *p*H of the marinated potatoes was 5.3 at the low level of marinating and 5.1 at the high level of marinating. Marinating the potatoes with French dressing, which was done immediately following inoculation with the test organism, and allowing the marinade to act for 1 hr.

TABLE 4 Palatability of potato and turkey salads*

SALAD FORMULA	PALATABILITY SCORE†	
	Not marinated	Marinated
Potato Salads		
High mayonnaise	0.9	0.8
High mayonnaise, high egg	1.0	1.2
High mayonnaise, low egg	1.0	1.0
High mayonnaise, high pickle	1.4	0.9
High mayonnaise, low pickle	1.3	1.0
High mayonnaise, low egg, high pickle	1.3	1.3
Low mayonnaise	0.6	0.4
Low mayonnaise, high egg	0.7	0.5
Low mayonnaise, low egg	1.0	0.7
Low mayonnaise, high pickle	1.0	0.9
Low mayonnaise, low pickle	0.9	1.1
Low mayonnaise, low egg, high pickle	1.3	1.1
Turkey Salads		
High mayonnaise, high celery	1.1	1.1
High mayonnaise, low celery	1.3	1.6
High mayonnaise, high pickle, high celery	0.7	1.1
High mayonnaise, low pickle, high celery	0.9	1.0
High mayonnaise, high pickle, low celery	1.2	1.5
High mayonnaise, low pickle, low celery	1.5	1.2
Low mayonnaise, high celery	0.9	1.1
Low mayonnaise, low celery	1.0	1.1
Low mayonnaise, high pickle, high celery	1.0	1.0
Low mayonnaise, low pickle, high celery	1.1	0.9
Low mayonnaise, high pickle, low celery	1.3	1.3
Low mayonnaise, low pickle, low celery	1.0	1.2

*For palatability tests, 1 gm. salt and 0.2 gm. onion powder were added to 100 gm. of each salad.

†All values are averages of 20 judgments. Scores were: 2 = very acceptable; 1 = acceptable; 0 = unacceptable.

before the remaining ingredients were added, had an effect in that the *p*H values of the salads were lowered and final counts were decreased. This effect was most pronounced in the high-mayonnaise samples. The palatability scores tended to be slightly lower in the marinated samples.

Effect of ingredients. In the *high-mayonnaise* samples the *p*H values and bacterial counts were, in general, lower than in the *low-mayonnaise* samples. The effect was more pronounced when the potatoes were marinated. Palatability scores tended to be higher in the high-mayonnaise salads.

Incorporation of *egg* into the basic mixtures increased *p*H values. Final counts were not affected, except that in some of the marinated samples the counts were slightly increased. Palatability scores were similar.

Incorporation of *pickle* lowered the *p*H values and decreased the bacterial counts, especially when used at the higher level. Palatability scores were similar at the two levels of pickle.

Among the twenty-four kinds of potato mixtures tested, those made with pickle and a high amount of mayonnaise had the lowest bacterial counts and the highest palatability scores.

TURKEY SALADS

The *p*H values and bacterial counts of forty-eight turkey salad mixtures are presented in Table 5. The palatability scores are given in Table 4.

Effect of holding. Holding the autoclaved mixtures of turkey meat, diced egg, and diced celery at 30°C. for a 3-hr. period following inoculation did not seem to have an effect on final bacterial counts. This was true whether or not the samples were marinated.

Effect of marinating. Marinating the autoclaved mixtures of turkey meat, egg, and celery, for 1 hr. following inoculation decreased the *p*H values and the bacterial counts of the salads, especially in the high-mayonnaise mixtures. The palatability scores were slightly higher in the marinated salads.

Effect of ingredients. Samples containing the higher amount of *mayonnaise* had, in general, lower *p*H values and lower bacterial counts; the effect was

TABLE 5 **Bacterial growth and pH of forty-eight turkey salad mixtures**

SALAD FORMULA	INOCULATED TURKEY, EGG, AND CELERY WHICH STOOD 3 HR. BEFORE REMAINING INGREDIENTS WERE ADDED						INOCULATED TURKEY, EGG, AND CELERY NOT ALLOWED TO STAND BEFORE REMAINING INGREDIENTS WERE ADDED					
	Not marinated			Marinated			Not marinated			Marinated		
	*p*H		Log final count per gram	*p*H		Log final count per gram	*p*H		Log final count per gram	*p*H		Log final count per gram
	Before autoclaving	After autoclaving		Before autoclaving	After autoclaving		Before autoclaving	After autoclaving		Before autoclaving	After autoclaving	
High mayonnaise, high celery												
Test 1	5.86	5.70	8.30	5.67	5.52	8.01	5.88	5.92	8.73	5.50	5.12	6.05
Test 2	5.98	5.92	8.29	5.65	5.36	6.98	5.91	5.58	8.70	5.49	5.30	6.62
High mayonnaise, low celery												
Test 1	5.91	5.95	8.11	5.71	5.69	7.18	5.79	6.15	8.52	5.81	5.79	6.84
Test 2	5.96	6.00	8.78	5.80	5.71	7.06	5.95	5.96	8.88	5.75	5.35	6.42
High mayonnaise, high pickle, high celery												
Test 1	5.55	5.13	6.11	4.81	5.12	4.34	5.39	5.00	6.17	4.79	5.78	3.83
Test 2	5.58	5.52	6.76	4.85	5.22	4.87	5.35	5.10	7.11	4.99	4.71	4.05
High mayonnaise, low pickle, high celery												
Test 1	5.02	4.58	7.70	5.21	5.72	4.67	5.65	5.75	7.64	5.29	4.90	4.54
Test 2	5.48	5.65	8.04	5.31	5.20	4.72	5.51	5.63	8.18	5.31	5.15	4.47
High mayonnaise, high pickle, low celery												
Test 1	5.61	5.77	7.48	5.57	5.80	6.02	5.25	5.60	8.14	5.40	5.60	4.80
Test 2	5.70	5.79	8.92	5.52	5.22	5.45	5.50	5.05	7.33	5.35	5.37	4.91
High mayonnaise, low pickle, low celery												
Test 1	5.71	5.90	8.37	5.12	5.03	5.74	5.61	5.96	8.45	5.51	5.69	6.44
Test 2	5.80	5.60	8.32	5.10	5.55	5.55	5.81	5.58	8.30	5.58	5.58	6.02
Low mayonnaise, high celery												
Test 1	6.11	5.94	8.39	6.00	5.60	8.29	5.95	6.11	8.61	5.99	6.23	8.37
Test 2	6.11	6.04	8.60	5.70	5.68	8.03	6.15	5.80	8.91	5.79	5.64	8.80
Low mayonnaise, low celery												
Test 1	6.10	6.05	8.17	5.79	5.81	8.20	6.00	6.18	8.40	6.10	5.87	8.65
Test 2	6.21	6.17	8.87	5.80	6.00	8.81	6.00	5.83	8.78	6.00	5.61	8.48
Low mayonnaise, high pickle, high celery												
Test 1	5.49	5.90	7.75	5.41	5.10	6.44	5.68	5.58	7.17	5.34	5.12	5.41
Test 2	5.38	5.40	7.83	5.45	5.81	6.09	5.58	5.51	7.32	5.26	4.72	<5.50
Low mayonnaise, low pickle, high celery												
Test 1	5.61	5.65	8.61	5.61	5.79	7.16	5.15	5.82	8.56	5.59	5.42	6.51
Test 2	5.81	5.92	8.15	5.55	5.15	7.94	5.58	5.65	8.43	5.61	5.21	6.37
Low mayonnaise, high pickle, low celery												
Test 1	5.82	5.62	7.32	5.55	5.40	7.03	5.75	5.72	8.38	5.71	5.10	6.55
Test 2	5.81	5.63	7.43	5.60	5.81	7.07	5.61	5.35	8.23	5.78	5.36	6.38
Low mayonnaise, low pickle, low celery												
Test 1	5.76	5.70	8.81	6.05	5.70	7.12	5.91	5.60	8.33	6.00	5.72	7.83
Test 2	5.87	5.95	8.52	5.82	5.48	7.46	6.09	5.78	8.59	5.90	5.64	7.98

most pronounced in the marinated samples. Palatability scores were similar in these salads, regardless of the amount of mayonnaise used.

The *p*H values and bacterial counts were slightly higher in the *low-celery* samples. The palatability scores of the low-celery salads were better than those of the *high-celery* salads.

Incorporation of *pickle*, in general, lowered the *p*H values and the bacterial counts. The effect was strongest in the high-pickle mixtures. No consistent effect on palatability was noted.

Among the twenty-four kinds of turkey mixtures tested, those that were marinated and were made with pickle and a high amount of mayonnaise had the lowest bacterial counts and highest palatability scores.

Discussion

The fact that bacterial counts were, in general, lower in the marinated salads points toward the feasibility of using marination as a practical method of reducing the chances for excessive bacterial multiplication of *Micrococcus pyogenes* var. *aureus* in potato and meat salads.

In addition to marinating, the incorporation of relatively large amounts of mayonnaise resulted in decreased *p*H values and bacterial counts.

The use of pickle as an ingredient to lower *p*H and bacterial growth was also effective. This had been demonstrated before in a study on sandwich fillings (2).

Although holding the inoculated materials for 3 hr. at room temperature did not affect the final counts, the practice of holding is discouraged, in principle.

Summary

The investigation was concerned with the effect on *p*H and bacterial counts in potato and turkey salads of holding some of the basic ingredients for several hours at room temperature following inoculation with *Micrococcus pyogenes* var. *aureus* S209; of marinating with French dressing these basic ingredients following their inoculation; and of varying the formulas used in preparing the salads. The ingredients varied were: for the potato salads, egg and pickle; and for the turkey salads, celery and pickle.

Twenty-four kinds of potato mixtures and twenty-four kinds of turkey mixtures were prepared. The mixtures were checked for *p*H and rated for palatability. They were inoculated with the test organism and incubated at 30°C. for 20 hr.

In general, the *p*H values and bacterial counts were high in the salad mixtures. Holding the inoculated (unautoclaved) potatoes at 30°C. for 3 hr. following inoculation had little, if any, effect on the final counts of the potato salads. Similarly, it did not seem to make a difference in the final counts of the turkey salads whether or not the inoculated (after autoclaving) turkey-egg-celery mixtures were held for a 3-hr. period following inoculation.

Marinating the inoculated materials with French dressing and allowing the marinade to act for 1 hr. before the remaining ingredients were added had a pronounced effect in that the *p*H values were lowered and final bacterial counts were decreased. This effect was most pronounced in the high-mayonnaise salads. Lowest final counts were found among the salads made with high amounts of mayonnaise and with pickle.

References

(1) Lewis, M. N., Weiser, H. H., and Winter, A. R.: Bacterial growth in chicken salad. J. Am. Dietet. A. 29: 1094, 1953.

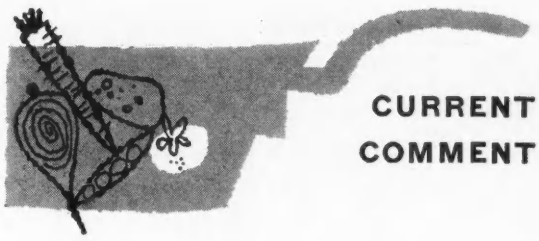
(2) Longree, K., White, J. C., and Lynch, C. W.: Bacterial growth in protein base sandwich fillings. Fillings made with egg, ham, and turkey. J. Am. Dietet. A., in press.

Zoo Animals with Arteriosclerosis

At the Penrose Research Laboratory, Philadelphia Zoological Garden, autopsy records on a varied selection of birds and mammals indicate that crowded conditions which cause social pressure have been a major factor in increasing the incidence of arteriosclerosis during the past twenty years.

This study suggests that the development of arteriosclerosis is the result of the interaction of a number of factors, some of which at least are not related to diet, In some of the animals, forced inactivity appeared to be important. Greater average age of animals, resulting from improved diets, was reflected in an increase in arteriosclerosis. As the animal population density increased, the incidence of arteriosclerosis increased even more. Many of the deaths were associated with injury. This tendency was especially noted in two animal families, which include the kangaroos, wallaroos, wallabys, and nutria.

These observations indicate that social pressure, through an imbalance in the adrenal secretion, has become a major factor in the frequency of arteriosclerosis in these animals.—*Abstracted from "Changing Frequency of Arteriosclerosis in Mammals and Birds at the Philadelphia Zoological Garden: Review of Autopsy Records" by H. L. Ratcliffe and M. T. I. Cronin. Circulation 18: 41, 1958.*



CURRENT COMMENT

New Method of Calculating Yield of Recipes

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EVERY FOOD production manager is continually faced with the need to control the quantity, quality, and cost of every menu item prepared. Such control can be achieved only by careful, accurate adjustment of standardized recipes to give the yield needed.

The conventional factor method, using either decimals or fractions, has been the tool used for adjusting yield of formulas for many years. However, a new method of adjustment has been developed which, because of its simplicity, has much promise for institutions.

To illustrate the two methods of adjusting recipe yield, let us use as an example a formula for chicken à la king. Cooking tests have indicated that we can expect about a 30 per cent loss in weight during preparation and serving of this product. For these calculations, let us plan to serve 6-oz. portions of the finished product. Our recipe is set up for a yield of 100 servings. For the sake of illustration, let us assume that we wish to prepare 170 servings from our original recipe. Our problem is to expand the recipe accurately to the desired yield as quickly as possible.

The Old Method

To expand this recipe accurately to 170 servings by the usual factor method, multiply the weight of each ingredient by 1.7, the factor obtained by dividing the desired new yield by the known yield of the recipe (170 ÷ 100) (see accompanying box). Be sure to double-check your figures by adding together the new weights calculated for each ingredient. The total *must* equal the old total weight multiplied by 1.7 or a mistake has been made.

Remember to record the time it took to make these calculations and check them for accuracy!

Chicken à la King

Old Method of Conversion

INGREDIENTS	WEIGHT FOR 100 6-OZ. PORTIONS		ORIGINAL MULTIPLIED BY	CALCULATED WEIGHT FOR 170 SERVINGS	
	lb.	*oz.*		*lb.*	*oz.*
Fowl, cooked and boned	16	3	1.7	—	—
Green peas, drained	5	6	1.7	—	—
Mushrooms	3	—	1.7	—	—
Flour, soft	1	10	1.7	—	—
Chicken fat	3	4	1.7	—	—
Chicken stock	24	5	1.7	—	—
Salt	—	4¼	1.7	—	—
	—	—		—	—
Total	54	¼		91	13½

New Percentage Method of Conversion

INGREDIENTS	WEIGHT FOR 100 6-OZ. PORTIONS		% TOTAL WEIGHT OF INGREDIENTS	WEIGHT FOR 170 SERVINGS (to be read from slide tool)	
	lb.	*oz.*		*lb.*	*oz.*
Fowl, cooked and boned	16	3	30	—	—
Green peas, drained	5	6	10	—	—
Mushrooms	3	—	5½	—	—
Flour, soft	1	10	3	—	—
Chicken fat	3	4	6	—	—
Chicken stock	24	5	45	—	—
Salt	—	4¼	½	—	—
	—	—	—	—	—
Total	54	¼	100	—	—

TABLE 1 **Ingredient weight per portion (in hundredths of pounds)**

LOSS IN COOKING AND SERVICE	READY-TO-SERVE PORTION WEIGHT IN OUNCES												
	2	2½	3	3½	4	4½	5	5½	6	6½	7	7½	8
%													
none	.13	.16	.19	.22	.25	.28	.32	.35	.38	.41	.44	.47	.50
5	.14	.17	.20	.23	.27	.30	.33	.36	.40	.43	.46	.49	.53
10	.14	.18	.21	.24	.28	.31	.35	.38	.42	.45	.49	.52	.56
15	.15	.18	.22	.25	.30	.33	.37	.40	.44	.48	.52	.55	.59
20	.16	.20	.24	.28	.32	.36	.39	.43	.47	.51	.55	.59	.63
25	.17	.21	.25	.29	.34	.38	.42	.46	.50	.54	.59	.63	.67
30	.18	.22	.27	.31	.36	.39	.45	.49	.54	.58	.63	.67	.72
35	.20	.24	.29	.34	.39	.43	.48	.53	.58	.63	.68	.72	.77
40	.21	.26	.32	.37	.42	.47	.52	.57	.63	.68	.73	.78	.84
45	.23	.28	.34	.40	.46	.51	.57	.62	.68	.74	.80	.85	.91

The New Method

For the new method we will use the same recipe, but set it up differently. In addition to listing the ingredients by pounds and ounces, we list each in terms of *percentage* of the total weight of the recipe. These percentage figures are obtained by dividing the weight of each ingredient by the total weight of all ingredients in the recipe. Our basic recipe is now shown in the bottom half of the box.

Once the basic recipe has been calculated in terms of percentage, you need never calculate it again. It is now the basis for *any number* of portions of *any size* you may choose. To accompany recipes set up in this manner, a special calculator or chart (1) has been worked out to make this possible. On the back of the calculator is a conversion table from which can be derived the appropriate weight for *any* portion size between 2 and 8 oz. You can use this table to determine the weight of ingredients needed to make a single serving of *any* desired size. This table (Table 1) automatically makes allowances for normal cooking and handling losses as follows:

5%—for handling loss only
10%—salmon loaves, tuna loaves, bread dressings
15%—creole shrimp and similar dishes using cooked shrimp
20%—creamed tuna, salmon à la king
25%—meat loaves
30%—chicken and turkey à la king
45%—stews, ragouts

It is suggested that you use this guide until you are able to make accurate tests of cooking and handling losses for your own recipes. Losses vary to some degree because of different production methods.

Now, to determine the weight of ingredients of chicken à la king needed to make one portion and then for 170 portions, use Table 1 and following steps:

(a) Locate the desired portion size (at the top of the columns).

(b) Locate the typical loss percentage in the left-hand column.

(c) Read the table as you would a mile indicator on a road map at the point where the two columns meet. This figure represents the total weight of ingredients (in terms of a fraction of a pound) needed for *one* serving.

(d) Multiply this figure by the number of servings required to find the total weight of ingredients needed to prepare the number of portions of the size you have selected. Round this figure to the closest full pound. For example, using the 30 per cent cooking and handling loss for chicken à la king: for 170, 6-oz. servings, multiply .54 by 170 to obtain 91.8 lb. (the same total weight of ingredients shown in the box under the old method of conversion). The same procedure could, of course, be used to calculate the total ingredient weight needed for any other number of portions of any other size. For instance, for 150, 5½-oz. servings, multiply .49 by 150 to obtain 73.5 lb. total ingredient weight.

You are now ready to use the total weight figure to read directly from the special calculator[1] to obtain the weight of each ingredient needed for the 170 servings of chicken à la king. A "blow up" of this calculator is shown in the accompanying Figure 1. Set the sliding bar so that the total weight needed (in this case 92 lb.) is exposed in the opening of the bar, and convert the percentage figures for your recipe to pounds and ounces by reading directly from the enlarged section of the calculator. The figures on the bottom row of the sliding bar are percentages ranging from ⅛ to 90 and may be combined to obtain any percentage desired. The numbers which appear in the squares in the open slot of the sliding bar are pounds (the left-hand figure in each square) and ounces (on the right, following the dash).

Now simply read directly the weight in pounds and ounces of each ingredient you will need in the opening of the sliding bar above the percentage of the ingredient. Record these (as below) and note your total time so that you may compare it with the time needed to figure by the old method.

[1]The Recipe Magician©.

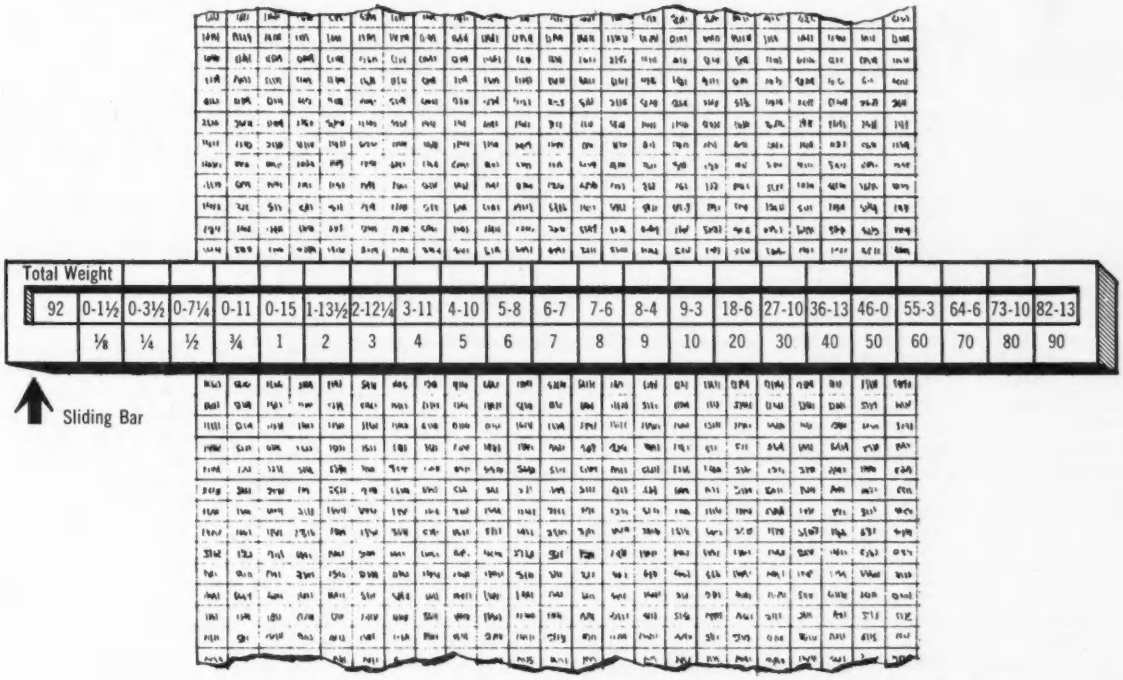


FIG. 1. *Slide-rule calculator for use in converting percentage to pounds and ounces.*

INGREDIENT	% TOTAL WEIGHT OF INGREDIENTS	WEIGHT FOR 170 SERVINGS	
		lb.	*oz.*
Fowl, cooked and boned	30	27	10
Green peas, drained	10	9	3
Mushrooms	5½ (5+½)	5	1¼
Flour, soft	2	1	13½
Chicken fat	6	5	8
Chicken stock	45 (40+5)	41	7
Salt	½	....	7¼
Total		92	2

If cost control or excessive plate waste indicates a need to cut the serving size from 6 to 5½ oz., then follow the 30 per cent loss line in Table 1 across to the point at which it meets the 5½-oz. column. Multiply this figure (.49) by the number of servings needed (170 × .49 = 83.3 lb.). Then, instead of setting the sliding bar of the calculator at 92 lb. as you did in the previous example, set it at 83 lb. Your ingredient weights are accurately and automatically adjusted for this total weight of ingredients. Because adjustments in *size* of servings as well as in *number* of servings may be made so easily, it is well worth the time required in the beginning to calculate your recipes on a percentage basis.

Comparing the Two Methods

Each method has advantages, of course. But let us examine them carefully.

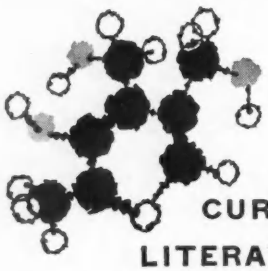
The old method has the obvious advantage of being familiar to most of us. Over the years, dietitians, supervisors, cooks, and office workers have wrestled constantly with changing recipes from one yield to another. Aside from this dubious advantage, little can be said for the old "factor method." At best, its use tempts workers to guess or to estimate quantities. The complexity of constant conversions involving pounds, ounces, fractions, decimals, quarts, cups, tablespoons, and teaspoons is frustrating—even to those who are adept at arithmetic. And most of us are not!

This calculation is time-consuming. All too often, we are likely to sacrifice accuracy to save time. Then follow the inevitable errors which result in product failure, over- or underproduction, customer dissatisfaction, and uncertain portion costs.

In considering the new method, we must be realistic enough at the outset to admit that it will not appeal to some simply because it *is* new. It also requires the tool (the calculator), a portion of which is shown in Figure 1. But which of us would tear a loaf of bread in pieces for lack of a knife or a slicer? This new tool can be as helpful in calculating *your* recipes as the knife is for cutting bread.

Reference

(1) CALLAHAN, J. F.: "Magic" method for scaling recipes. Institutional Feeding & Housing 8: 66 (Jan.), 1957.



CURRENT LITERATURE

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THE AMERICAN JOURNAL OF THE MEDICAL SCIENCES

Vol. 236, October, 1958

*Obesity and diabetes. J. M. Strang.—p. 405.

Obesity and Diabetes. In the obese who become diabetic, the failure of the carbohydrate-handling capacity has resulted from prolonged overtaxing of this capacity associated with the long time use of high-carbohydrate, low-protein diets. This state develops at a time when the total metabolic load has been raised due to the obesity and, in addition, at a time when the body has become adapted to a carbohydrate fuel system as a result of the prolonged high-carbohydrate intake. The lowering of the body requirements for carbohydrate-handling can be promoted in three ways: (a) reduce the level of carbohydrate mass exchange; (b) reduce the total metabolic load; and (c) reduce the proportion of the total metabolic load provided by carbohydrate.

THE AMERICAN JOURNAL OF MEDICINE

Vol. 25, September, 1958

*Hunger and appetite. Physiologic regulation of food intake. H. D. Janowitz.—p. 327.

Hunger and Appetite. Only a multiple factor analysis can attempt to do justice to the complexity of the problem of the regulation of food intake. The following formulation may be made in the light of present day knowledge. At the physiologic level of regulation of intake, deficits of the body stores of calorically significant nutrients activate feeding reflexes which are facilitated in the lateral hypothalamus and inhibited by the ventromedial hypothalamus. These deficits concomitantly give rise to hunger sensations which may be cues to food intake (the epigastric pain associated with the gastric contraction being a dispensable component of the complex of disagreeable sensations). These hypothalamic centers are sensitive to local temperatures and appear to be influenced by body stores of water. Day-to-day regulation of food consumed is metered in part by oropharyngeal receptors, and the size of an individual meal is controlled by gastric and upper intestinal receptors responding to distention probably mediated by the vagus. The hypothalamic centers are also believed to be influenced by the metabolic consequences of food being absorbed and assimilated. The specific dynamic action of food, the utilizable blood glucose, the concentration of other metabolites in the blood, the level of protein of the diet, and depot fat have all been proposed as cues to the central nervous system, but none has been firmly established as governing short- or long-term control. Probably the most important impetus to modern study of the regulatory mechanism for food intake has been the belief that this is a fruitful approach to the problem of obesity. It should be emphasized that food taking is a homeostatic mechanism capable and worthy in itself of being studied along with the many other physiologic regulations of the body.

THE AMERICAN JOURNAL OF NURSING

Vol. 58, October, 1958

*The fabric makes the uniform. C. W. Kelly.—p. 1384.

*Counseling—or criticizing? G. K. Lewis.——p. 1408.

The Fabric Makes the Uniform. The many light-weight, labor-saving fabrics now available—wrinkle-resistant, easy to launder, needing little or no ironing, and adaptable to many types of styling—have come close to revolutionizing the uniform industry. The new fabrics, such as rayon, nylon, "Dacron" polyester fiber, and blends of these fibers with each other and with cotton, are as durable as the ones used formerly and are so adaptable to styling and so easy to care for that fashion has become possible in the uniform field. This is important, but, in choosing a uniform, it should not overshadow the fabric's inherent qualities. Ask these questions: Does the fabric look well? Will it remain neat-looking throughout a day's wear? Is it opaque, wrinkle- and crease-resistant? Does it have a tendency to turn yellow? Is it comfortable, cool, light weight, absorbent, antistatic? Will it wear well, fray easily, require frequent mending? Will it resist soiling and staining? Will it launder well, shrink, need starching, react well to bleaches, dry quickly, iron easily? Is the price right? If the material is dyed, is it color-fast? Not all fabrics will meet all these criteria to the same degree. The individual must decide which is best for her. Suggestions for laundering and care of the various fabrics are included in this article.

Counseling—or Criticizing? There has been a tendency to think of counseling as advising people about their work, with emphasis on pointing out their errors. It is not the function of counseling, formal or informal, to "show up the person," but rather to attempt to help this person change her behavior, the ultimate goal of all counseling. If you counsel wisely, you will learn from the counselee what he feels his problems are and other information of which you may not have been aware. To be most effective, counseling should take place as soon as possible after an incident occurs. Good, on-the-spot counseling strengthens relationships because it says "I do want to help you get this straightened out" not "here is a list of things you have done wrong during the last month."

THE AMERICAN JOURNAL OF PSYCHIATRY

Vol. 115, October, 1958

*The effect of dextrose, fat emulsion and amino acids on the rate of disappearance of alcohol in the blood. J. Schiller, R. Peck, and M. Goldberg.—p. 365.

Alcohol Absorption. A study was conducted on ten patients who had imbibed 120 ml. of 100-proof whiskey. Determinations showed that the infusion of 5 per cent glucose did not accelerate the rate of alcohol disappearance in the blood, nor did an intravenous dosage of 500 ml. fat effect a significant change. However, amino acids administered intravenously as a 5 per cent mixture lowered the concentration of alcohol in the blood 50 mg. per 100 ml. by the end of the first hour.

AMERICAN JOURNAL OF PHYSIOLOGY

Vol. 195, October, 1958

*Distribution of "intrinsic factor" activity. V. Herbert and T. H. Spaet.—p. 194.

Distribution of Intrinsic Factor Activity. After pre-incubation with hog intrinsic factor concentrate (HIFC), marked enhancement of CO^{60}-labeled vitamin B_{12} uptake at 0°C. by rat and human liver slices and by segments of rat small intestine was observable. No such marked enhancement by HIFC was observable in rat kidney, heart, or spleen slices. After pre-incubation with serum from normal human beings or patients with pernicious anemia, slight enhancement of CO^{60}-B_{12} uptake by rat liver slices was noted; marked enhancement was noted after pre-incubation with a 15-fold concentrate of normal human serum. The hypothesis is presented that there may exist a circulating intrinsic factor involved in the selective deposition of vitamin B_{12} in the human liver.

AMERICAN JOURNAL OF PUBLIC HEALTH

Vol. 48, October, 1958

*Supplementation of diets with proteins and amino acids. N. W. Flodin.—p. 1315.

*The psychology of dietary change. W. W. Hamburger.—p. 1342.

*Psychological aspects of obesity in adolescence. H. Bruch.—p. 1349.

*Obesity in the adolescent. G. H. Lowrey.—p. 1354.

Protein and Amino Acid Supplementation. The effects of low-efficiency protein diets on nutritional status and

their probable deleterious effect on work output are considered. The most logical means of improving protein efficiency is to use both protein supplements and amino acids simultaneously. The use of milk solids, lactalbumin, dried yeast, and soy as protein supplements and lysine as an amino acid supplement is discussed. The steady population upsurge will force even technically developed countries to use these principles to maintain a good level of nutrition. Even today in the U. S., inadequate protein intakes and suboptimum nutrition occur frequently in children, pregnant women, adolescents, the aged, and the underprivileged.

Psychology of Dietary Change. Dr. Hamburger discusses some of the many factors which determine food selection, including: the built-in homeostatic nutritional tendencies of the human organism; the physiologic factors of taste and palatability; the influence of early childhood experience, emphasizing the child's emotional relationship to its mother; the importance of the associational and symbolic meanings of food to the individual; and the cultural factors influencing food selection, including the tremendous advertising pressures. These factors must be considered in any public health program to alter the American diet. From the metabolic point of view, a moderate reduction in total fat intake, or the substitution of more vegetable and fish oils for animal fats seems psychologically feasible. However, Dr. Hamburger predicts that there will be limitations to any attempt at altering intake of fat in the diet. Dietary habits of adults are not easily changed.

Psychologic Aspects of Adolescent Obesity. This article stresses the importance of underlying emotional disturbances in obese patients which often are psychosocial. Obesity is of particular concern in adolescence because this age is most affected by cultural and social rejection. It may sound paradoxical but reducing is not the cure for obesity. It becomes possible only after considerable adjustment has been achieved. The ability to reduce only confirms that such improvement has occurred. To be of real help to obese adolescents, a more respectful and understanding approach to their problems is essential. There is need for a new type of public education about overweight, namely approaching it without insulting the dignity of people who need help.

Adolescent Obesity. This article deals with the dietary treatment of obesity and the recognition of the psychologic elements involved. As a guide to therapy, it is necessary to devote enough time to obtain a good history of the variety of factors that may contribute to overweight. True glandular obesity is extremely rare, and it is usually easily recognized when it is present. Diet plays an essential role, but the most important part is finding out *why* the patient eats excessively. An extremely strict diet may be detrimental to the physical development of the child, plus the fact that he feels so terrible and hates the diet that eating becomes an obsession with him. It is also important to instill in young mothers attitudes of some degree of moderation toward the intake of food and the gain of weight in early infancy. Excessive weight gains may be modified at this time rather than to allow them to continue into later adolescence.

ANNALS OF INTERNAL MEDICINE

Vol. 49 September, 1958

*Diabetic neuropathy presenting as the initial clinical manifestation of diabetes. M. Ellenberg.—p. 620.

Research in arteriosclerosis—the first fifty years. Editorial.—p. 699.

Vol. 49, October, 1958

*Serum cholesterol, electrophoretic lipid pattern, diet and coronary artery disease: A study in coronary patients and in healthy men of different origin and occupations in Israel. D. Brunner and K. Lobl.—p. 732.

The nephrotic syndrome in adults: A common disorder with many causes. R. M. Kark, C. L. Pirani, V. E. Pollak, R. C. Muehrcke, and J. D. Blainey.—p. 751

Some recent developments pertaining to pancreatitis. J. B. Gross—p. 796.

*Fat absorption and pancreatic function in diabetes mellitus. H. S. Aktan and A. P. Klotz.—p. 820.

Nontropical sprue and functioning islet-cell adenoma of the pancreas: Report of case. H. H. Scudamore, W. M. McConahey, and J. T. Priestley.—p. 909.

Diabetic Neuropathy. During recent years there has been a growing awareness that diabetes mellitus is a generalized, complex, fundamental disease process with many facets. The disorder of carbohydrate metabolism is only one of these facets, although its train of symptoms is the most commonly recognized. Other facets include the complications of pregnancy, arteriosclerotic involvement of the larger vessels, micro-angiopathy comprising retinopathy and nephropathy, and neuropathy. Any of these manifestations may occur before the visual symptoms of diabetes are evident. The present study indicates that diabetic neuropathy may be the initial clinical symptoms of diabetes and that it is not dependent on the presence of prolonged hyperglycemia and glycosuria.

Lipid Patterns of Coronary Patients. An investigation of lipid patterns of coronary patients suggests that the serum beta cholesterol levels in milligrams per 100 ml. are a better index of atherogenic activity than is the total serum cholesterol level or any other lipid or lipid pattern combination. The subjects were from various groups of apparently healthy European Jews in different occupations and a group of Yemenite Jews. The professional workers (physicians) had significantly higher average beta cholesterol levels than did manual workers.

Fat Absorption and Pancreatic Function in Diabetes Mellitus. Results of fat absorption and pancreatic function studies in ten patients with diabetes and ten control subjects are reported. The secretin test for pancreatic function was normal in both groups except for one patient with diabetes secondary to chronic pancreatitis. Of the three diabetic patients with diarrhea, two had mild steatorrhea.

THE BRITISH JOURNAL OF NUTRITION

Vol. 12, No. 3, 1958

*The influence of alternate high-protein and low-protein feeding on growth and reproduction and on regeneration of haemoglobin in rats. A. W. I. van Dam-Bakker, A. P. de Groot, and R. Luyken.—p. 259.

Alternate High- and Low-Protein Feeding. Results in this study revealed that animals given a high-protein and a low-protein moiety of ration alternately were, in various respects, in a less favorable condition than those given both moieties simultaneously. Growth, and particularly lactation, were harmfully influenced. Even when the young, after weaning, were placed on normal ration, the difference in weight persisted. Hemoglobin formation was also slightly disturbed. During recovery from severe, induced anemia, the hemoglobin was always less in the group given protein intermittently.

BRITISH MEDICAL BULLETIN

**Vol. 14, September, 1958*

Metabolism of lipids—Symposium of 12 papers in a special issue.

Metabolism of Lipids. Under lipid metabolism may be included the metabolism of fatty acids and their esters, phospholipids, sterols, and certain hydrocarbons. The papers presented in this issue cover most of the major issues that are in the forefront of advancing knowledge at the present time. These include the biosynthesis of fatty acids, hormonal effects *in vitro* on lipogenesis in mammary tissue, fat absorption and its disorders, biosynthesis of cholesterol, the absorption and metabolism of sterols, removal of lipids from the blood stream, hormonal control of the circulating lipids, the effect of dietary fats on the blood lipids and their relation to ischemic heart disease, fats and blood coagulation, essential fatty acids and the skin, essential fatty acids and human disease, and lipids and the structure of myelin. The presentation of each article is thorough and concise. This volume of the *British Medical Bulletin* is recommended to anyone interested in a complete review of lipid metabolism.

BRITISH MEDICAL JOURNAL

No. 5097, September 13, 1958

*Anaemia of uncertain origin in infancy. R. G. Hendrickse and M. A. R. King.—p. 662.

No. 5098, September 20, 1958

*Effects of salts of nicotinic acid on serum cholesterol. R. Altschul and A. Hoffer.—p. 713.

Dinitrophenol and diabetes mellitus. A comparison with salicylate. J. Reid.—p. 724.

Anemia in Infancy. Severe anemia in infancy is often seen at University College Hospital, Ibadan. The results of investigation of twenty-four cases of severe anemia in infancy indicate that malaria is the probable cause of the anemia. Malnutrition and iron deficiency play no significant part in the etiology. The possibility that nivaquine might exert a specific hematinic influence is considered. The typical clinical picture was a breast-fed baby about nine months old with fever, cough, and, in about 50 per cent, vomiting of one week's duration. Examination showed hepatosplenomegaly, and, in 50 per cent, cardiac signs. Treatment consisted only in giving nivaquine in large doses irrespective of malarial parasitemia, supplemented with blood transfusion when necessary. The patients were maintained on their accustomed diet. There were two deaths.

Effects of Niacin Salts on Serum. It seems well established that niacin in relatively high doses decreases serum cholesterol in healthy and sick human beings. The toxicity of the substance may be due to the high acidity in those cases where occasional gastro-intestinal reactions were noted. Tests on twelve healthy young individuals showed that a buffered solution of niacin is as efficacious in decreasing serum cholesterol as is the pure nicotinic acid. In cases of poor tolerance, a solution of nicotinic acid buffered with $NaHCO_3$ (or $NaHCO_3$ and $KHCO_3$) deserves to be tried.

FOOD RESEARCH

Vol. 23, September-October, 1958

*Studies on enzymatic tenderization of meat. II. Panel and histological analyses of meat treated with liquid tenderizers containing papain. C. E. Weir, H. Wang, M. L. Birkner, and B. Ginger.—p. 411.

*Studies on enzymatic tenderization of meat. III. Histological and panel analyses of enzyme preparations from three distinct sources. H. Wang, C. E. Weir, M. L. Birkner, and B. Ginger.—p. 423.

*A study of the biochemistry of irradiated potatoes stored under commercial conditions. J. S. Schreiber and M. E. Highlands.—p. 464.

*Effects of radiation and of cooking on the quality of baby beef liver. C. Williams, J. Yen, and F. Fenton.—p. 473.

Composition of ten processing and table varieties of Virginia apples. A. Lopez, P. J. Fellers, C. B. Wood, and J. M. Johnson.—p. 492.

Carotenoids in passion fruit juice (*Passiflora edulis*, Sims). J. S. Pruthi and G. Lal.—p. 505.

Meat Tenderizers Containing Papain. The basic problem in using enzymes to tenderize meat appears to be that of obtaining uniform enzyme distribution. Commercial meat tenderizers of the liquid type containing papain dissolved in concentrated salt solution and including generally, hydrolyzed vegetable protein, present a possible means of assisting enzyme penetration. In this study, the influence of tenderizing agents on the structure of the muscle tissue as determined histologically is correlated with the effects noted by panel evaluations. Ribeye steaks were made more tender by this tenderizer. There was no change in muscle fiber extensibility. The sorcolemma and muscle fiber envelopes were disintegrated and extensive granulation of the endomysial collagen occurred. The histologic changes were apparent in the cooked, but not in the raw steaks. The increase in tenderness and granulation brought about by the tenderizer solution was unaffected by aging the meat more than 48 hr. before treatment or by holding at temperatures below 40°F. prior to cooking. The increase was more pronounced when frozen steaks were allowed to thaw before cooking. Thawing at 70°F. resulted in mushiness of the steak surface and a greater increase in over-all tenderness.

Studies on Tenderization of Meat. Correlations between morphologic and panel observations of the effect of tenderizing agents are presented. A close relationship was demonstrated between enzyme-induced changes in tissue structure and panel response to tenderness differences. The ability of an enzyme to hydrolyze hemoglobin and gelatin did not reflect its activity as a meat tenderizer. A differentiation was made by the panel between initial tenderness and residue after chewing. Enzymes of plant origin (ficin, papain, and bromelin) affected both of these groups of structures and properties. Microbial and fungal enzymes (Rhozyme P-11 and fungal amylase) affected principally the former group.

Irradiated Potatoes. In this study, changes that occurred in three varieties of potatoes when irradiated at two levels and stored for thirteen months were determined. The most significant result was the much greater rotting of the irradiated samples when compared with the controls. The lots irradiated at the high dosages had 33 per cent more rot than the controls, and the low-dosage lots had 29 per cent more rot. There did not appear to be any commercially significant differences in any of the biochemical constituents, with the possible exception of the reducing and total sugars values for one variety towards the last half of the storage period. From the seventh through the twelfth month, the controls exhibited lower reducing and total sugars values than their respective irradiated samples.

Effects of Radiation and Cooking on Liver. The effects of radiation and of cooking on baby beef liver were determined. Radiation resulted in decreased palatability scores for odor, flavor, texture, juiciness, and tenderness; decreased preference rank; decreased cooking weight loss and cooking drip loss. Decrease in palatability, particularly those due to oxidation, might have been less if the meat had been packed in an inert gas. Allowing the frozen liver to stand exposed to the atmosphere at room temperature before it is cooked might also result in a decrease in the undesirable flavor. Electronic cooking resulted in slightly lower juiciness scores and higher cooking drip losses than did conventional cooking. Other factors were not significantly different in the cooking methods. Thiamine losses were not great from either radiation or cooking.

FOOD TECHNOLOGY

Vol. 12, October, 1958

*The role of lysine in cereal food products. C. Feldberg and C. P. Hetzel.—p. 496.

*Vitamin K_5 as a food preservative. H. Y. Yang, W. F. Steele, R. W. Stein, R. F. Cain, and R. O. Sinnhuber.—p. 501.

*A sampling method for household surveys. II. Panel characteristics and their relation to usage of wine. F. Filipello, H. W. Berg, and A. D. Webb.—p. 508.

*Preparation of new and improved products from Eastern (dry-type) sweet potatoes: chips, dice, julienne strips, and frozen French fries. E. G. Kelly, R. R. Baum, and C. F. Woodward.—p. 510.

*Factors affecting storage stability of spray-dried tomato powder. J. C. Miers, F. F. Wong, J. G. Harris, and W. C. Dietrich.—p. 542.

*Effect of individual curing ingredients on the shelf stability of canned comminuted meats. J. H. Silliker, R. A. Greenberg, and W. R. Schack.—p. 551.

*Maintaining freshness of berries using selected packaging materials and antifungal agents. J. C. Ayres and E. L. Denisen.—p. 562.

Lysine Supplement for Cereals. Supplementation of wheat-based foods with lysine will improve their protein quality and result in improved growth and tissue synthesis. Wheat protein is naturally deficient in lysine. In addition, processing lowers the lysine content. Lysine supplementation has also improved the protein of rice, rye, and breakfast cereals. It may be possible to improve diets in underprivileged areas of the world by feeding lysine-supplemented cereals. Lysine-supplemented cereals may be recommended during periods of growth, pregnancy, lactation, and stress, such as recuperation from surgery and illness, and for geriatric feeding.

Vitamin K_5 as a Food Preservative. The value of vitamin K_5 in prolonging the storage life of a variety of food products was studied. It inhibited growth of organisms obtained from moldy Cheddar cheese in an agar medium in concentration of 40 p.p.m. For organisms obtained from frankfurters, 60 p.p.m. were required. Low concentrations of vitamin K_5 (10 and 20 p.p.m.) prolonged storage life of crab meat, but the extreme discoloration would prevent commercial use. Development of a derivative of the vitamin might be a means of circumventing this problem. Heat stability of vitamin K_5 was demonstrated in agar streak plate tests and by the preserving action obtained in mushroom sauce after processing at 250°F. for 1 hr. Results would indicate that use can be made of vitamin K_5 for the preservation of food products not completely consumed immediately after

opening the container. It would have value in certain military feeding systems where refrigeration is not available.

Wine Usage. Employing a stratified, random sample of Sacramento households ($3,000 to $10,000 yearly family income) willing to participate on a wine-tasting panel, a number of characteristics were noted in their relation to wine usage. General use of wine increased with age of individual, implying that wine usage requires familiarization over an extended time. Use of wine was affected by number of adults in the family; less usage was demonstrated by one-adult families. The socio-economic area and wine-consuming habits were not related. The educational level did not affect the use of wine by men, but a greater proportion of regular users among women were college graduates. Both parental and extra-familial influences were shown to affect wine usage. There was a definite preference for 3 per cent sugar against 1 per cent in the Rosé test wine.

New Sweet Potato Products. A number of varieties of Eastern grown (dry-fleshed) sweet potatoes have been prepared in the form of chips, julienne strips, and dice (cubes) by deep-fat frying and methods previously described for other vegetables. These products were compared for crispness, toughness, color, and flavor with chips made from moist or "yam" type varieties. French fried pieces were made under similar conditions of frying at varying times for use as frozen French fries. These were evaluated by taste panels after oven warming for periods similar to those used for frozen white potato French fries. Yields of finished product based on unpared and trimmed weights of many of the different varieties were calculated. Moisture values of fresh dug, storage cured, and three-month stored sweet potatoes of at least two varieties were determined and the moisture contents were related to the oil absorption of the finished products. Carotene values were determined for several varieties, both fresh and after cooking, and the effect of three months' storage on the carotene content and the flavor were noted. The sweet potato products were well received by consumer-type panels (both homemaker and food manufacturer). There was a difference of opinion between panel members in regard to the preference for a toasted taste as compared with a slight "raw" taste.

Storing Tomato Powder. Data show that spray-dried tomato powder can be stored for twelve months at 100°F. when the powder is packed with a desiccant and canned in an inert atmosphere. Under such conditions, off-flavors, loss in ascorbic acid or sulphite, and change in soluble color were insignificant. High moisture levels, presence of O_2, and storage temperatures of 90°F. or higher were detrimental factors to storage stability. Thus, if O_2 were eliminated from the can atmosphere by replacing with an inert gas, a moisture content of 1.8 per cent (and perhaps higher) could be tolerated at 70°F. for long periods. At the higher temperatures of 90° and 100°F., it was necessary to reduce the moisture content with an in-package desiccant and to pack in an inert atmosphere. Reasonable storage stability in respect to flavor, soluble color, and ascorbic acid retention was obtained.

Shelf-Stability of Canned Comminuted Meat. Most shelf-stable canned cured meat products commercially available receive thermal processing far below that considered necessary to destroy resistant bacterial spores. It has been shown by several investigators that individual curing salts in concentrations consistent with legal and organoleptic limits do not prevent spore germination and outgrowth in canned meats. Which of the components of commercial canned cured meat contribute to its shelf-stability was the concern of this investigation. It was found that, although viable spores could be recovered from the product after retorting, no spoilage occurred during incubation. The responsible factor was the combined effect of nitrite, salt, and thermal injury. When used individually, each element was unsuccessful in retarding spoilage. Nitrate enhanced commercial spoilage without preventing putrefaction. The nitrite-salt-heat effect depended on the low concentration of spores normally indigenous to meats. Artificial inoculation with large numbers of spores resulted in failure of the system. The investigators feel that these results offer an explanation for the excellent commercial experience with this type of product.

Maintaining Freshness of Berries. Experiments were conducted to determine whether packaging materials and/or antifungal agents might be used to maintain freshness of strawberries, raspberries, and cranberries held in a refrigerated display case. Cellulose acetate, PHD-, LSAD-, and LSD-Cellophane, polystyrene Q 641.4, polyethylene, Pliofilm, Visten, uncoated Mylar (50 ga.), Saran, Cryovac, and kraft paper bags were tested. Berries were dipped in water solutions of one of the following antifungal agents: mycostatin, myprozine, rimocidin, ascosin, and candidin. In addition, field tests were made by spraying one of the antifungal agents on the fruit and allowing the berries to air-dry before picking; also the fungicide, captan, was sprayed on these fruits. Color and appearance of strawberries and raspberries packaged in cellulose acetate, polystyrene Q 641.4, and LSAD-Cellophane were better than in other materials; color and appearance of cranberries after two months' storage were best in Mylar. Water-vapor transmission rates for most of the films were unsatisfactory for optimum storage life; also, considerable package fogging occurred during refrigeration cycle breaks. Plastic containers were preferable to wooden boxes; the latter were less attractive and tended to contribute to mold growth. Berries dipped in water solutions of rimocidin or myprozine immediately prior to packaging had smaller microbial loads and somewhat longer storage life than did undipped or water-dipped controls. Results with antifungal sprays applied in the field immediately prior to harvest were less beneficial.

JOURNAL OF AGRICULTURAL AND FOOD CHEMISTRY

Vol. 6, October, 1958

*Chemical changes in corn during preparation of tortillas. R. Bressani, R. Pas y Paz, and N. S. Scrimshaw.—p. 770.

*Effect of lime treatment on *in vitro* availability of essential amino acids and solubility of protein fractions in corn. R. Bressani and N. S. Scrimshaw.—p. 774.

*Effect of processing on the epsilon-amino groups of lysine in peanut proteins. L. Bensabat, V. L. Frampton, L. E. Allen, and R. A. Hill.—p. 778.

Corn Nutrient Losses. Corn consumed in the form of flat cakes or tortillas is the principal food of lower income families in Central America. Important changes in nutritive value result from heating the corn in lime water to soften it for tortilla preparation. The changes in samples of white and yellow corn used in a Guatemalan highland Indian village were determined. For the white corn, the combined physical and chemical loss from corn to tortilla dough averaged 60 per cent of the thiamine, 52 per cent of the riboflavin, and 32 per cent of the niacin, as well as 10 per cent of the nitrogen, 44 per cent of the ether-extractable portion, and 46 per cent of the crude fiber. The yellow corn lost 65 per cent of the thiamine, 32 per cent of the riboflavin, 31 per cent of the niacin, and 21 per cent of the carotene, as well as 10 per cent of the nitrogen, 33 per cent of the ether-extractable portion, and 32 per cent of the crude fiber.

Lime and Heat Effects on Corn Nutrients. The effect of the combined lime and heat treatment on *in vitro* availability of essential amino acids and solubility of protein fractions in corn is presented in this paper. Data show that the solubility of zein is significantly decreased by the treatment which corn receives in making tortillas. Other nitrogen fractions also show a lower solubility but not to the same extent. The decreased solubility of zein should improve the biologic value of the soluble proteins, as zein is the poorest of the corn proteins. The lime-heat treatment also increases the rate of release of most of the essential amino acids. These results suggest an explanation for the improved growth of rats fed tortillas as compared to corn.

Heat Effects on Peanut Proteins. Peanut flour can be analyzed for protein deterioration by following the change in the epsilon-amino groups of lysine. It was found that peanut cotyledons subjected to the highest

heat for the longest time during the cooking operation showed the greatest decrease in this value for lysine. The value decreased from 3.4 gm. lysine per 16 gm. nitrogen for blanched cotyledons to a value of 1.9 for the meal prepared from cotyledons after a 2-hr. cooking operation. The value decreased to only 2.8 gm. lysine per 16 gm. nitrogen in the meal when the cooking was at a lower temperature and limited to 1 hr. Preparation of peanut flour for human food will require processing conditions which involve a minimum heat damage to the protein.

JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION

Vol. 168, October 11, 1958

*Fellowships for research in clinical nutrition. Council on Foods and Nutrition.—p. 768.

*Elevated serum cholesterol level. Questions and Answers.—p. 844.

*Utilization of calcium. Questions and Answers.—p. 844.

Vol. 168, October 18, 1958

*Lactic acid bacilli in cow's milk. Questions and Answers.—p. 981.

*Allergy to hard-shelled clams. Questions and Answers.—p. 982.

Vol. 168, October 25, 1958

*Serum proteins in hepatic cirrhosis. Foreign Letters–India.—p. 1151.

*Aspiration of food and vomitus. Foreign Letters–United Kingdom.—p. 1152.

*Obesity in a young child. Questions and Answers.—p. 1167.

*Lecithin in the diet. Questions and Answers. —p. 1168.

Vol. 168, November 1, 1958

*Scrap iron intoxication. R. H. Gadsden, R Mellette, and W. C. Miller, Jr.—p. 1220.

*Cheese and serum cholesterol level. Questions and Answers.—p. 1294.

*Calcium and arteriosclerosis. Questions and Answers.—p. 1297.

*Breast feeding and deodorants. Questions and Answers.—p. 1297.

Clinical Nutrition Fellowships. The conditions of the fellowships for research in clinical nutrition and details of application are discussed. These fellowships are sponsored by The Nutrition Foundation, Inc., in cooperation with the Council on Foods and Nutrition of the American Medical Association. In 1959, ten fellowships will be given.

Elevated Serum Cholesterol. A patient who suffered a myocardial infarction is described. He is now on a fat-restricted diet and receives papaverine, hydrochloride bishydroxycoumarin, and a combination of unsaturated fatty acids with vitamins B_6 and E. In spite of this, the serum cholesterol stays considerably elevated. It is felt that none of these measures except for the unsaturated fatty acids should influence blood lipids. This patient should have adequate examination to eliminate the possibility of myxedema or nephrotic syndrome with coincident hyperlipemia. If these can be eliminated, it would seem justified to discontinue medication other than the low-fat diet and anticoagulant therapy.

Utilization of Calcium. The calcium of powdered milk is as well utilized as is that from fluid whole milk. It is present in the same form. The extent of the utilization of calcium depends on other dietary factors, such as the amount of phosphorus, vitamin D, and the chemical forms of these elements. The calcification of the teeth is influenced by a number of factors. Vitamin D is essential to normal calcification, and the parathyroid glands play a part in regulating the concentration of calcium ions in the blood plasma. According to the Council on Dental Therapeutics of the American Dental Association, "The available evidence indicates that if the calcium intake is adequate for general health, addition of calcium compounds to the diet does not serve to prevent dental diseases including caries or to medicate their effects."

Lactic Acid Bacilli in Cow's Milk. Lactic acid bacteria are present in the milk as it comes from the cow. They do not generally gain access in the milking and later handling. Early in the history of bacteriology, it was thought that milk was sterile when it came from the udder. There have been many studies since then showing that in aseptically drawn samples of milk there is an average of 25,000 bacteria per milliliter.

Allergy to Hard-Shelled Clams. A patient is described who develops cramps after the ingestion of hard-shelled clams (quahogs), but not of other fish and shellfish. It is felt that this can be termed an allergy. In some patients, the cause may not be the quahog alone, but other allergenic foods or spices eaten with it. Sensitivity can be specific or else quite general. There is no answer as to why the patient described is sensitive only to quahogs. However, it would be best for this patient to avoid them, especially since he can enjoy so many other shellfish.

Serum Proteins in Cirrhosis. The electrophoretic pattern of serum proteins in thirty-six patients with hepatic cirrhosis was studied. The total serum protein levels were lowered in all patients. The serum albumin level was lower than normal and the alpha globulin level was raised in 72 per cent of the patients. The beta globulin level was raised in only two patients. The gamma globulin level was raised in most patients. All these changes were more marked in patients with ascites than in those without. The lowering of the albumin level was due to deranged hepatic function, the liver being its normal organ of synthesis while various factors might be responsible for the rise of gamma globulin. Thus it might indicate antibody response and might partly be due to incomplete disposal of gamma globulin or greater production of this fraction by the spleen which was increased in size in most patients with hepatic cirrhosis.

Aspiration of Food and Vomitus. Aspiration is most likely to occur in infants and patients coming out of anesthesia. For infants, the aspiration of a large quantity of milk may be immediately fatal, particularly if they are feeble. In anesthetized patients, aspiration of the contents of the stomach is still a major cause of death. Aspiration is a hazard of illness rather than of health and is particularly likely to occur in the feeding of recumbent patients who are old, ill, and perhaps narcotized. Prevention lies in insisting on drinking being done in a sitting position only. It has been shown with the use of barium sulphate that aspiration can take place after death. This should be borne in mind if the diagnosis of aspiration is to be made at autopsy.

Obesity in a Young Child. Usual dietary advice and appetite-suppressing methods are notoriously unsuccessful in obese children. It is generally more appropriate to view the overeating as a symptom which is serving some psychologic need. It would, therefore, be somewhat inappropriate to focus directly on dietary limitation without attempting to provide an opportunity for the child to work through some of his problems relating to need for excessive food intake. If the child is pushed to relinquish the symptom before adequate preparation has been undertaken, it is conceivable that other psychologic difficulties might occur which might be more formidable than that of overeating.

Lecithin in the Diet. Lecithin is a phosphatide and is also called a phospholipid. Because of its natural emulsifying properties and ready availability, one of its principal uses is as an ingredient in foods. For a long time, lecithin has been used as a food supplement. While it may be regarded as a completely nontoxic, wholesome food ingredient, it is probable—as in the case of all other food ingredients—that excessive use is undesirable. The possibility of using lecithin to excess is unlikely, due to its relatively high satiety value.

Scrap Iron Intoxication. The use of "scrap iron" or "scrap," as an alcoholic beverage was noted by a marked increase in the number of persons with toxic psychoses who were admitted to psychiatric hospitals. It is so named because of its peculiar metallic taste. The chief ingredients are isopropyl alcohol and naphthalene. It is felt that the use of scrap iron could increase because of the cheapness and because of its intoxicating effect. The severe physical and mental symptoms which result are discussed.

Cheese and Serum Cholesterol. There are many variables concerned with the amount of cholesterol present in the body that one cannot blame any one dietary item, such as cheese. The Food and Nutrition Board of the National Research Council has recently published a pamphlet in which this conclusion is made: "Evidence to support the concept that high levels of plasma cholesterol, *per se*, in man are atherogenic is far from conclusive. Circumstantial evidence,

however, indicates that the kind, or amount, of dietary fat is in some way related to some stages of atherosclerosis in man. A reduction in intake of the more saturated fats in the diet may ultimately prove desirable for health but is not yet mandated by currently available evidence."

Calcium and Arteriosclerosis. There is no known evidence implicating calcium in the development of arteriosclerosis. Some workers believe that an excessive consumption of animal fat, of which milk fat is one example, does have a causal relationship with atherosclerosis. However, this relationship has not yet been proved by research.

Breast Feeding and Deodorants. The quantity of breast milk that becomes available during lactation depends mainly on the inherent ability of the lactating glands to secrete and the ability of the infant (or pump) to completely empty each breast at least three times within 24 hr. It seems conceivable that during the application of deodorants in the axillas, sufficient material reaches the breasts and nipples to provoke a distaste so that the infant does not empty the breasts, which then quite promptly secrete less. It is doubtful that the external and superficial application of such material exerts a direct antigalactagogue action.

THE JOURNAL OF BIOLOGICAL CHEMISTRY

Vol. 233, October, 1958

*The specific distribution of fatty acids in the glycerides of animal and vegetable fats. F. H. Mattson and E. S. Lutton.—p. 868.

Fatty Acids in Glycerides of Fats. By means of pancreatic lipase, which specifically removes the fatty acids esterified with the primary hydroxyl groups of glycerol, the location of the fatty acids in the glycerides of a number of naturally occurring vegetable and animal fats has been studied. It is concluded: (a) Naturally occurring triglycerides exhibit a high degree of specificity of fatty acid distribution, so that random distribution does not occur in either vegetable or animal fats. (b) In the vegetable fats, the saturated fatty acids are esterified with the primary hydroxyl groups of glycerol. (c) No general pattern of distribution prevails among the animal fats, although non-random distribution is evident. This is particularly apparent with respect to oleic-linoleic acid distribution. (d) Lard is unique in that it is the only one of all the fats studied in which the saturated fatty acids are predominantly in the 2 position.

THE JOURNAL OF THE CANADIAN DIETETIC ASSOCIATION

Vol. 20, September, 1958

*One man's meat. B. L. Balla.—p. 27.

One Man's Meat. The food habits of ethnic groups, which now form an important part of the Canadian population, are of increasing interest and concern to nutritionists, dietitians, and food service workers. A nutrition research team of the Department of National Health and Welfare has undertaken a project of collecting data on the nutritional status and food habits of the Hungarians who have recently arrived in Canada, following the Hungarian Revolt in October 1957. Laboratory examinations and physical measurements were also taken. Various phases of this project are discussed in this article.

THE JOURNAL OF CLINICAL INVESTIGATION

Vol. 37, September, 1958

*Manganese metabolism in man: Rapid exchange of Mn^{56} with tissue as demonstrated by blood clearance and liver uptake. D. C. Borg and G. C. Cotzias.—p. 1269.

Manganese Metabolism. Combined studies of blood clearance and radiation measured over the liver in human beings following the intravenous injection of tracer doses of Mn^{54} showed a consistent pattern. The transfer of manganese from blood into intracellular sites was rapid throughout the body. The data showed further that most or all of the endogenous manganese became available for interchange within an hour. Hence, most of the element within the body must exist in dissociable chelates or other relatively labile intracellular combinations. Considering the constancy of tissue concentrations of manganese, this demonstrates that manganese metabolism is under homeostatic control. At least three, and probably four, apparent body compartments participated to some extent in the distribution of Mn^{56} within the first hour. The first component analyzed from the blood disappearance curve probably reflects the net trans-capillary passage of the element. Tracer concentration falls steeply in the capillaries, and about 70 per cent of the normal blood manganese leaves the circulation each minute. The transendothelial transport of manganese appears to be by passive diffusion. It follows that net turnover from the blood is perfusion-limited, despite subsequent intracellular concentration. Identical mechanisms appear responsible for most of the swift inflow of manganese into liver and simultaneously into other organs. Mitochondrial uptake throughout the body is regarded as underlying the bulk of this rapid tissue retention, which largely determines a second component analyzed from the blood data as well. A mitochondrial role is in accord with the known biochemistry of manganese *in vitro*.

JOURNAL OF THE NATIONAL CANCER INSTITUTE

Vol. 21, August, 1958

*Variation in incidence of and mortality from stomach cancer, with particular reference to the United States. W. Haenszel.—p. 213.

Stomach Cancer. Available evidence on the variation in stomach cancer incidence and mortality with respect to time trends, age, sex, race, country, geographic latitude, nativity, socioeconomic class, and urban-rural residence is reviewed. Some interesting facts are revealed. In the search for exogenous factors that might influence the geographic distribution of stomach cancer, dietary factors are the most obvious. The possible dietary effects fall in three general categories: (a) the presence of a carcinogen occurring naturally in food, including such physical properties as food texture; (b) a carcinogen introduced in food preparation, such as food temperature; and (c) the absence of some protective factor. It is suggested that retrospective studies of patients with cancer and matched controls be done to associate differences in diet. Data on variation in national diets may serve as a basis for selecting items to include in such studies. Data should be presented for individual food items and not grouped into food categories. Accuracy in dietary histories is stressed. It is hoped that through controlled studies the isolation of some food item or combination might fit into the total epidemiologic pattern for stomach cancer. Also included in this article is a summary of variations in per capita consumption of several food items among population groups in the United States and in some countries with high stomach cancer rates.

THE JOURNAL OF NUTRITION

Vol. 65, August, 1958

*Wheat cereal diets, rat caries, lysine and minerals. F. J. McClure.—p. 619.

*Essential fatty acid deficiency. I. Content of polyenoic acids in testes and heart as an indicator of EFA status. E. Aaes-Jorgensen and R. T. Holman.—p. 633.

*The vitamin B_{12} content of *Azotobacter vinelandii*. L. Almon.—p. 643.

Diet and Rat Caries. Diets containing wheat flours, dry or toasted bread, or shredded wheat biscuit, cerelose or lactose, and liver powder resulted in a high incidence of severe smooth-surface caries in white rats. Autoclaving whole wheat flour with cerelose or lactose increased the caries potential whereas toasting of bread had no such influence. A lysine supplement reduced the dental caries produced by diets containing autoclaved wheat flour and toasted bread. Mineral supplementation with calcium carbonate plus sodium acid phosphate with milk ash significantly reduced the caries produced by the wheat-cereal diets. Neither calcium carbonate or calcium acid phosphate alone were cariostatic, whereas sodium acid phosphate alone significantly reduced the caries produced by a wheat flour diet. The percentage of ash calcium and phosphorus of the dentin and enamel of both incisor and molar teeth was unaffected by extreme deficiency in dietary calcium and a low phosphorus content. These analytical data were

unrelated to the smooth-surface caries as diagnosed in the molar teeth.

Essential Fatty Acid Deficiency. The fact that essential fatty acid (EFA) deficiency is accompanied by an increase in the trienoic acid content of tissue lipids has been demonstrated. The heart was the organ which showed the greatest change in polyunsaturated acids as a consequence of changes in dietary polyunsaturated acids. A subsequent study of the polyunsaturated acid content of lipids from various tissues revealed testes lipid to be richest in these substances. In this study, rats were fed an EFA-free diet, and the polyunsaturated acids of the testes and heart were analyzed. Analysis of the testes lipids revealed that, as the deficiency developed, dienoic acids decreased and trienoic acids increased markedly, even at a time when drastic changes of the spermatogenic tissue had not yet occurred. This is suggested as a convenient biopsy method for evaluation of EFA status. Analysis of the hearts at the end of the experiment revealed a marked increase in trienoic acid content and a decrease in dienoic acid in the deficiency group. Measurement of trienoic acid content of heart tissue appears to be the best criterion for the evaluation of the EFA status of an animal.

Vitamin B_{12} in Azotobacter. A dried azotobacter product has been proposed as a possible food supplement primarily because of its high protein content. Because protein foods must furnish accessory as well as primary food factors, the vitamin content is of interest. In this study the vitamin B_{12} content of dried *Azotobacter vinelandii* was investigated. The vitamin B_{12} activity was low compared with that of some other microorganisms. Part of this may be due to the method of the assay. The addition of dried azotobacter to a standard vitamin B_{12}-deficient ration permitted rats to gain weight to the same degree as a control group fed the same ration with a vitamin B_{12} supplement amounting to the level calculated to be contained in the azotobacter. If the widely held belief is valid that microorganisms either synthesize vitamin B_{12} or require it preformed in their milieu because it is needed for their metabolism, then azotobacter is an organism which can satisfy its needs with very low amounts.

THE JOURNAL OF SCHOOL HEALTH

Vol. 28, September, 1958

*The need for nutrition education—a challenge! F. E. Whitehead.—p. 228.

Nutrition Education—A Challenge. This paper by Dr. Whitehead is directed to home economics teachers to challenge them to re-evaluate their roles. She states that modern nutrition education is more "behavior centered" than "information centered." Telling people what to do is easy, but it is difficult to influence human behavior. If at present it might appear that nutrition education is adequate, it must be remembered that each new generation must be taught and that the science of nutrition is an evolving one. Home economics teachers, in accepting the challenge of modern nutrition education, have a dual role to play. They must keep up with not only what is new in nutrition, but also what is new in education. As they grow in their appreciation of the interrelationships of nutrients, they must also grow in their understanding of the interrelationship of the several disciplines concerned with behavior.

THE NEW ENGLAND JOURNAL OF MEDICINE

Vol. 259, September 4, 1958

Magnesium metabolism (Concluded). W. E. C. Wacker and B. L. Vallee.—p. 475.

Vol. 259, September 11, 1958

Diabetes mellitus. S. B. Beaser.—p. 525.

Vol. 259, September 18, 1958

Diabetes mellitus (Concluded). S. B. Beaser.—p. 578.

Vol. 259, September 25, 1958

*Arctic anemia. R. W. Christie.—p. 605.

Vol. 259, October 9, 1958

*Patterns of breast feeding. I. Factors affecting the frequency of breast feeding in the newborn period. E. J. Salber, P. G. Stitt, and J. G. Babbott.—p. 707.

Arctic Anemia. Anemia unexpectedly occurred in all six members of a scientific expedition exploring the central Greenland Ice Cap in the spring and summer of 1955. This unusual response in the blood was revealed by weekly measurements of hemoglobin and red cells in the peripheral blood of each expedition member over a period of three and a half months. During this period all members were being subjected to hard physical exercise, low temperatures, moderately high altitudes, and continuous daylight. The group was composed of white males under thirty-one years of age, none of whom were of Mediterranean ancestry, and none of whom had been in polar regions for the previous eight months. All were in good health. Instead of the anticipated gradual increase in erythrocytes and hemoglobin in response to the increasing altitude, a drop in each parameter was discovered almost immediately, followed thereafter by moderate rises. When maximum altitude had been reached (3600 meters), erythrocytes had attained levels to be expected in healthy adult men living at sea level. Later, as altitude decreased but other conditions remained the same, hemoglobin and erythrocytes again fell. By the time the expedition was airlifted from the Ice Cap at the end of fourteen weeks, each was slightly below normal range. Within six weeks after returning to the U.S., four of the five members cooperating in the follow-up study had blood values within the normal range. Food supplies made a well balanced diet possible and included large quantities of fresh frozen cuts of beef, veal, pork, and other meat. Fresh-frozen, dehydrated, and canned fruits (including citrus fruit juices fortified with ascorbic acid) and vegetables were eaten liberally by all party members. Although everyone ate heartily, five of the six men lost weight, probably due to vigorous activity.

Breast Feeding. Frequency of breast feeding was investigated in 114 healthy primiparous women who attended the Family Health Clinic in Boston between 1950 and 1956. The sample was neither random nor representative of Boston antenatal clinics as a whole since it included an unusual number of college-educated women. Sixty-two per cent of the women attempted breast feeding. Various factors were tested for their influence on the mothers' decisions to breast- or bottle-feed their babies. The most important factors contributing to a higher percentage of breast feeding were college education of the parents and higher social class. There appears to be, at present, a revival of interest in breast feeding, and this is reflected in the greater proportion of women of the middle and upper social classes who breast feed. The trend of decline in breast feeding has not yet been reversed in working- and lower-class mothers. Age of the mother, her race, and the size of the family into which she herself had been born were without effect. In addition, her own mother's breast-feeding performance did not affect the daughter's behavior, nor did living in a home disrupted by death or divorce. Similarly, it made no difference whether the pregnancy was planned or unplanned, nor did it weigh heavily in the final outcome whether she preferred a boy or girl first-born child and whether this desire was fulfilled. There appeared to be a regional variation in the choice of method of baby feeding, mothers born in New England having a greater tendency to bottle-feed their babies than those born elsewhere. Most mothers had made up their minds about whether they would breast- or bottle-feed long before their babies were born, and there was little change of decision thereafter. Clearly, then, if a doctor wishes his patient to try breast feeding, the lying-in period is too late for such advice.

NURSING OUTLOOK

Vol. 6, September, 1958

*Demand feeding in the newborn nursery. C. S. Smith.—p. 514.

*Trends and advances in infant nutrition. P. Gyorgy.—p. 516.

Demand Feeding. An obstetric nursing instructor tells how a nursery for newborn infants changed from a rigid feeding schedule to a relaxed demand feeding schedule. Demand feeding is defined to mean "feeding the infant when he expresses the need of hunger, with limitations placed upon him by the nursery staff." The

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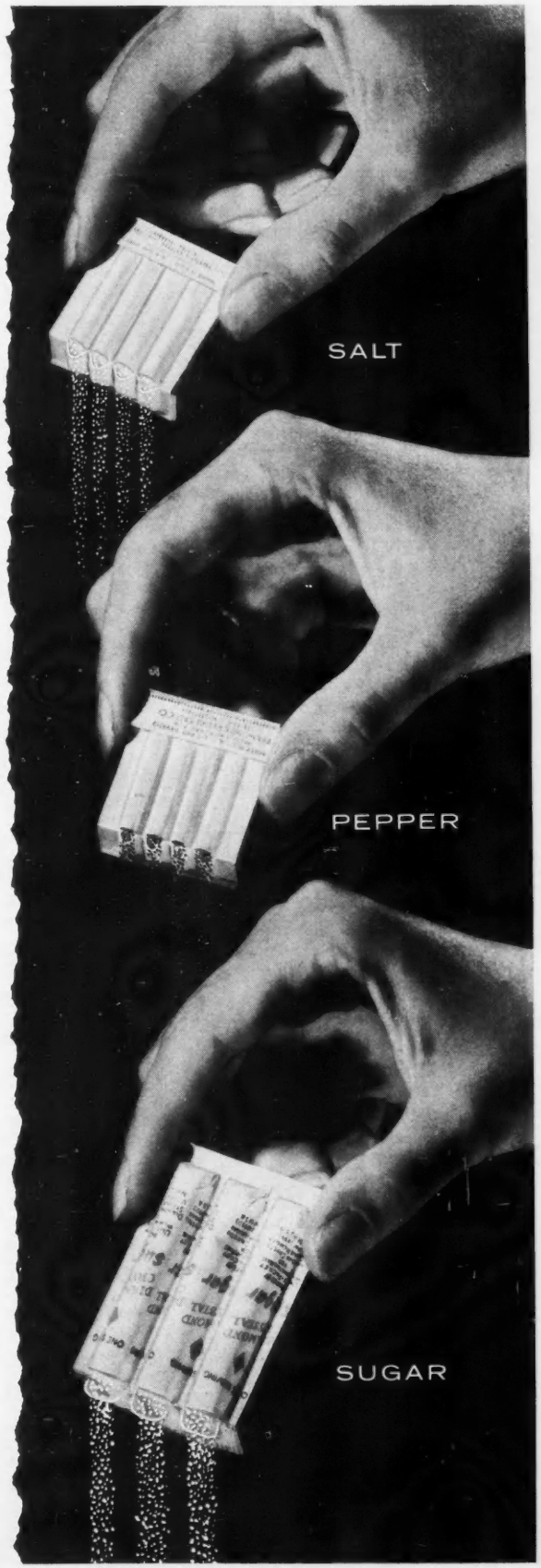


full-term, healthy infant was limited to feedings no oftener than every 2½ to 3 hr. Nurses determined the infants' need for feeding from the types of crying and took the babies to the mothers. This gave the mothers confidence that they knew how to feed their babies. The nurses had more time, as they no longer had to feed babies on their return to the nursery. Physicians and nurses were pleased with the results, and mothers and infants were content.

Infant Nutrition. This author, a pediatrician, advocates breast feeding. Although cow's milk may be used with excellent results in infant feeding, it remains a substitute food for human infants. He feels that with cow's milk formulas there is a tendency to overfeed and too much stress is placed on high-protein intake. Maximum weight gain should not be the primary goal in infant nutrition. He feels that there is no reasonable scientific-medical support for early mixed feeding for infants. One reason for using this plan is that mothers are swayed by commercial appeals. Semisolid foods introduce a number of potential sources of allergy. There are also weighty psychologic reasons for opposing early mixed feeding. Early spoon feeding must overcome the thrusting reflex of the tongue. This pediatrician disapproves of long-term replacement of cow's milk by such substitutes as soy bean preparations. He concludes that in infant nutrition, sound scientific facts should support any new idea.

NUTRITION

Vol. 12, Autumn, 1958

The metabolic aspects of Cushing's syndrome. A. S. Mason.—p. 99.

Organization and growth of dietetics as a profession in the United States. A. M. Beeuwkes.—p. 103.

*Dietetics in the Netherlands. Th. F. S. M. v.Schaik.—p. 109.

*The social dietitian. K. Rose and E. M. Wilson.—p. 117.

The edible portion and waste in foodstuffs in a Middle Eastern country (Iraq). H. Izmirlian and H. Gounelle.—p. 122.

Dietetics in the Netherlands. A brief insight into dietetics in the Netherlands is given in this article, including the establishment of a training course for dietitians in 1935, the founding of The Netherlands Dietetic Association, and the various types of positions the Dutch dietitian holds. At present there are three training courses for dietitians, and the Association has a membership of three hundred.

The Social Dietitian. One problem that confronts every dietitian is how the patient responds to dietary instructions, particularly those in the home. In 1947, a social dietitian was appointed to the staff of the Dietetic Department of the Royal Infirmary of Edinburgh. This social aspect of the work has been carried on since then by three successive dietitians. The social dietitian must be an experienced dietitian who has the ability to understand and appreciate patients and their social problems and conditions. The social dietitian becomes acquainted with the patients in the hospital, and then she visits them in their own homes. The patients have been very appreciative of the opportunity to discuss their problems on their own territory, away from the hospital environment and where there are no other distractions. It is particularly hoped that the social dietitian can improve the response of obese patients to dietetic treatment.

NUTRITION REVIEWS

Vol. 16, October, 1958

*Insect control vs. human nutrition. G. C. Decker.—p. 289.

Vol. 16, November, 1958

*Nutrition of mammalian cells in tissue culture. R. P. Geyer.—p. 321.

Insect Control. Plant and animal pests rank among the foremost causes of destruction, deterioration, and contamination of food. The necessity of protecting crops and produce from serious attack by insects, plant diseases, and other pests is obvious. However, a considerable portion of the American public has become concerned with the possible public health hazard problems that might be associated with insecticides and pesticides. Despite the assurances of the U. S. Department of Agriculture, the Food and Drug Administration, the U. S. Public Health Service, and the National Research Council that these hazards are potential, not real, and that there is no cause for alarm, there are individuals who insist that the use of pesticides is wholly unjustifiable. However, if we are to hold our own in this continuing battle against pests, research must be expanded.

Mammalian Cells in Tissue Culture. Considerations of the nutritional requirements of any species embrace both qualitative and quantitative aspects. Newer techniques and improved refined media have made possible studies of cells in tissue culture which are concerned with both of these. The successful propagation *in vitro* of many different cells of both normal and malignant origin, and the use of cells growing from fresh tissue explants, allow a wide selection of experimental material. Studies of the nutritional requirements of mammalian cells in tissue culture can contribute to the broad field of nutrition.

PSYCHOSOMATIC MEDICINE

Vol. 20, September-October, 1958

*Physical activity, emotions and human obesity. A. Stunkard.—p. 366.

Obesity. This study suggests that decreased caloric expenditure resulting from restricted physical activity may play an important role in obesity. An investigation of the reasons for decreased activity indicates that physical activity in man is determined by a variety of influences: biologic, social, and emotional. Depression, thus, may not be a purely incidental occurrence in obese persons; it may be one of the main reasons why they are obese.

PUBLIC HEALTH REPORTS

Vol. 73, October, 1958

*Developing an ordinance and code for food vending machines. W. C. Miller.—p. 903.

*Copper poisoning from vending machines. S. H. Hopper and H. S. Adams.—p. 910.

Food Vending Machines. With the rapid expansion of food vending machines during the past few decades, many states and communities and the trade organization of the industry requested the Public Health Service to develop a model sanitation ordinance and code for vending machines. After four years of investigation, the recommended ordinance on the vending of foods and beverages was published in July 1957. This suggested legislation is not solely a product of the Public Health Service, but represents the views of state and local health officials and the vending machine industry. The major provisions of the ordinance are discussed in this paper.

Copper Poisoning from Vending Machines. Machines that vend carbonated beverages have occasionally been the source of copper poisoning. If the check valves in a post-mix type vending machine do not function correctly, carbon dioxide may enter the water supply line. In the event the line is made of copper, then the carbon dioxide or carbonated water will react with copper, and under certain conditions the quantities of copper going into solution could be quite large. Hence, copper poisoning could occur from a beverage dispensed from a post-mix type, carbonated beverage machine. It is recommended that these machines be constructed so as to preclude contact between copper and carbon dioxide or carbonated water, and such machines be equipped with a device to provide positive protection against the backflow of carbon dioxide or carbonated water into the water supply system of the building in which the machine is located.

SCIENCE

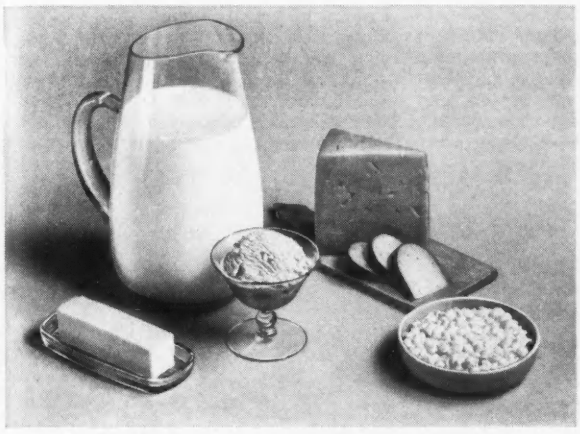
Vol. 128, October 31, 1958

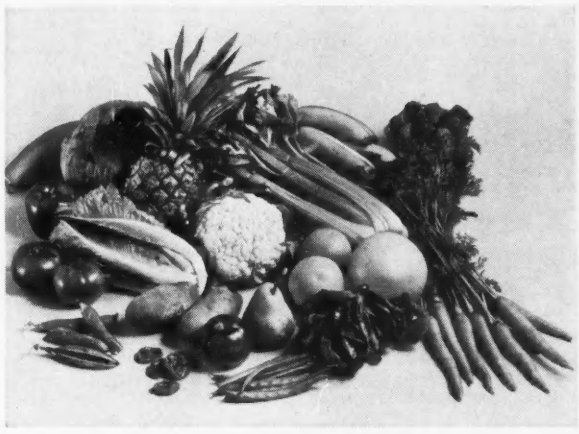
*Changes in tryptophan peroxidase activity in developing liver. A. M. Nemeth and V. T. Nachmias.—p. 1085.

Vol. 128, November 7, 1958

*Beneficiation of soils contaminated with strontium-90: Beneficial effects of potassium. W. F. Libby.—p. 1134.

Tryptophan Peroxidase Activity. Some enzymes found in adult mammalian liver are absent from fetal liver. These enzymes are present in low activity at the end of gestation, and they increase rapidly to adult levels in a matter of hours or days after birth. It has been suggested that one mechanism that controls the enzyme pattern is that of substrate induction. Studies reported in this paper on tryptophan peroxidase in the guinea pig show that the controlling mecha-





TEAMWORK

Foods selected from four food groups, by supplementing each other, can provide all of the energy and essential nutrients needed by adults and children for health . . . maintenance . . . and growth.

In *A Guide to Good Eating*, our common foods have been placed in four separate groups as shown in the chart. Each group makes special contributions. These minimum servings provide the average adult approximately the following amounts of the Recommended Dietary Allowances for essential nutrients . . .

from milk or its equivalent in dairy foods . . . ⅔ of the calcium . . . about ½ the riboflavin . . . ¼ the protein . . . and ⅕ the vitamin A . . .

from the meat group . . . when some eggs and glandular meats are chosen . . . more than ⅓ of the protein and iron . . . ½ the niacin . . . and about ¼ the thiamine, riboflavin and vitamin A . . .

from vegetables and fruits . . . all of the vitamin C . . . ¾ the vitamin A value . . . about ¼ the iron . . . and ⅕ the thiamine . . .

from enriched or whole grain breads and cereals . . . ¼ the thiamine . . . and ⅕ the niacin and iron.

In addition, each group provides significant amounts of many other nutrients. For instance, milk and dairy foods provide some of all nutrients known to be essential to man . . . and breads and cereals supplement the protein, B vitamins and minerals of the milk, meat, and vegetable-fruit groups.

Eaten in the minimum amounts suggested, these foods form the basis of an adequate diet but do not meet the recommended allowances for energy and all of the nutrients. Additional amounts of the same or other foods are usually needed. Sugars, syrups, fats and oils used in food preparation provide mainly energy.

When combined in well-prepared meals, foods selected from each of these four food groups can satisfy the tastes, appetites and nutrient needs of all members of the family . . . young and old.

USE DAILY

A GUIDE TO GOOD EATING

DAIRY FOODS
3 to 4 glasses milk—children
4 or more glasses—teenagers
2 or more glasses—adults
Cheese, ice cream and other milk-made foods can supply part of the milk

MEAT GROUP
2 or more servings
Meats, fish, poultry, eggs, or cheeses—with dry beans, peas, nuts as alternates

VEGETABLES AND FRUITS
4 or more servings
Include dark green or yellow vegetables, citrus fruit or tomatoes

BREADS AND CEREALS
4 or more servings
Enriched or whole-grain
Added milk improves nutritional values

The nutritional statements made in this advertisement have been reviewed by the Council on Foods and Nutrition of the American Medical Association and found consistent with current authoritative medical opinion.

Since 1915 . . . promoting better health through nutrition research and education

NATIONAL DAIRY COUNCIL

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nism increasing tryptophan peroxidase activity in adult liver after L-tryptophan injection is substrate induction. The relative refractoriness of fetal liver to L-tryptophan suggests that substrate induction is not the rate-limiting mechanism controlling the changes in enzyme activity observed during development.

Soils Contaminated with Strontium-90. It has been noted that the availability of radiostrontium to plants is lowered on its addition to certain soils. The possibility is indicated that treatment of heavily contaminated soils with ordinary fertilizers in reasonable amounts may have beneficial effects. The effects might reduce the consequences of reactor accidents or of local fallout during wartime very considerably. This study indicates clearly that the addition of sulphate is not very effective as a means of reducing radiostrontium pick-up by crops grown on contaminated soils. Although the addition of soluble strontium does seem to have some effect, the principal reduction observed was that effected by the addition of potassium. About a 40 per cent reduction of radio-strontium uptake was observed when potassium was used in amounts as low as about 30 lb. per acre for normal 2-in. depth of penetration of water-soluble fallout.

THE TOHOKU JOURNAL OF EXPERIMENTAL MEDICINE

Vol. 68, June 25, 1958

*Effect of oral administration of glucose on blood ATP level in diabetic patients. Y. Goto, I. Ito, and Y. Ujiie.—p. 51.

*Fluctuations of blood ATP, inorganic phosphorus and cholesterol after ingestion of butter in diabetic patients. Y. Goto and Y. Numazawa.—p. 57.

Glucose and Blood ATP in Diabetic Patients. Changes in the blood of diabetic patients have been studied for the purpose of seeing what metabolic changes occur in the tissues. The present study was undertaken to ascertain what changes in blood ATP (adenosine triphosphate) might be produced by oral administration of glucose. The ingestion of glucose produced an increase in blood ATP, both in diabetic and nondiabetic patients. This finding is apparently contradictory to previous findings by these workers. The blood inorganic phosphorus was depressed by oral administration of glucose, and this was much less marked in the diabetic group. Two younger diabetic patients showed a reverse reaction of blood inorganic phosphorus to the glucose ingestion.

Blood ATP, Inorganic Phosphorus, and Cholesterol. The metabolic disturbances in diabetes mellitus have been investigated mainly from the angle of carbohydrate metabolism. Few studies have been done on fat and protein metabolism. The present study was carried out to see how the blood ATP (adenosine triphosphate), inorganic phosphorus, and cholesterol contents change in diabetic patients after the ingestion of 25 gm. butter in comparison with nondiabetic patients. The blood ATP level was raised markedly in the healthy group, and it increased less markedly in the diabetic group. The depletion in blood inorganic phosphorus was provoked by butter ingestion; this was more prominent in the healthy group in comparison with the diabetic group. These facts indicate the disturbance in phosphorylation and utilization of fat in diabetic patients. Serum cholesterol did not change even after butter ingestion.

AMERICAN RESTAURANT

Vol. 42, September, 1958

*Organizing from the top.—p. 72.

*A guide to bargaining with growing labor power in restaurant industry. G. E. Clarke.—p. 76.

*How to turn production costs down. C. E. Blackburne.—p. 78.

Organizing from the Top. The article is a reprint of a booklet "Union Organization—Pressure Style," copyrighted by the American Retail Federation. The purpose of the booklet is to give information to the retailer who has has had no experience with unions and who is interested in his employees. It provides details on certain types of economic, psychologic, and legal actions which unions have used in the past in organizing drives and summarizes the rights and obligations of a retailer when faced with organization. It should be understood that the techniques discussed were used by retailers on the advice of competent counsel and tailored to meet individual circumstances. The material is not intended to substitute for or replace the services of a labor relations expert.

A Guide to Bargaining. Pointers on approaching and conducting labor negotiations are given. Some of the guides presented are: (1) You must plan strategy in advance. (2) Negotiations should be planned and conducted by experienced people. (3) Negotiators should be from all segments of the industry. (4) Do not emphasize technicalities and legalisms. (5) Use direct, clear, and simple language. (6) Don't be too subtle, and don't assume such an attitude on the part of the union. (7) Be calm, patient, and tolerant—and honest. (8) Never say plain, "No." (9) Don't agree if you don't mean it. (10) Get control of the negotiations. (11) Avoid impasses. (12) Don't make a final offer unless you really mean it. (13) Don't agree on anything until you have agreed on everything. (14) Have only one spokesman.

How to Reduce Production Costs. Food costs in food operations are kept under better control than labor costs. If your payroll is out of line, it may be a good idea to study the following eight points. (a) Be sure you take advantage of any and all labor-saving equipment you may have. (b) Is the physical layout of your unit the best that can be planned to save steps, eliminate wasted motion, and better co-ordinate the work of your employees? (c) Check up on the duties of each employee to satisfy yourself that methods and tools are the best to assure their doing the best possible job. (d) Keep a maintenance chart to insure that your equipment is oiled or lubricated at regular intervals to guard against costly breakdowns. (e) See that the temperature of water in dish- and glasswashing machines is maintained at the proper level. (f) Give some study to the problem of getting soiled dishes out of the dining area as quickly as possible after the meal is over. (g) Give particular attention to "bottlenecks." (h) Where feasible, use as many part-time employees as you can and hire only those employees who, you feel, like the food business. Preparation methods are important in cutting costs.

COLLEGE AND UNIVERSITY BUSINESS

Vol. 25, October, 1958

*Food service manager—advice from a restaurateur. L. Scott.—p. 42.

Food Service Manager. The good manager has subordinates who are trained, and his time should be spent in doing things beyond the immediate activities of the operation. The immediate problems are the ones his team should be trained to handle. The effective manager will develop his organization so that the operators will perform their routine work without his constant supervision and in turn he can engage in planning, coordiating, and directing in order to make his organization effective. He will maintain good human relations and will provide human satisfactions for his employees. The qualities of a good manager are: he makes a profit; he knows his job; he makes decisions and holds to them; he uses his time properly; he has analytical ability; he stays in good health; he develops good subordinates; he delegates and leaves delegated; he never passes the buck; and he develops all of his personnel.

DINER DRIVE-IN

Vol. 17, September, 1958

*New shapes for French fries.—p. 36.

*Tailoring tips for better sandwiches. O. Hanson.—p. 50.

Vol. 17, October, 1958

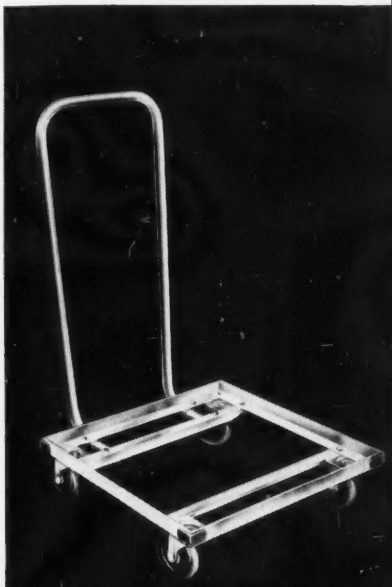
*Ways we found to cut cost. R. L. Manners.—p. 32.

*Selecting adequate seating. S. Ascher.—p. 42.

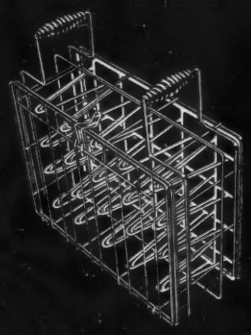
New Shapes for French Fries. New shapes in French fried potatoes make it easy to add a surprise element to menus. Frozen French fries are available in the "crinkle-cuts" as well as familiar strips, in bite-size shredded potato logs, and potato patties. Processed potato products provide cost control by eliminating waste, cutting costly preparation to almost nothing, and minimizing storage needs. They provide exact portion control, because cost and yield are calculated and

now 3 great new products

FROM THE MAKERS OF
Sani-Stack RACKS



Aluminum Dolly: Rounding out the Sani-Stack Rack Handling System is this new, light weight—sturdy dolly. Angle cross braces are positioned so that different size racks may be easily accommodated. To protect other equipment, as well as the dolly itself, each of the four corners contains a plastisol coated bumper—**an exclusive Sani-Stack feature.** The large 4" silent wheels run smoothly on rubber tires and frictionless ball bearings. A tubular handle is available if desired. Although this 20x20 dolly can be used for practically all racks—dollys for specific rack sizes are also available.

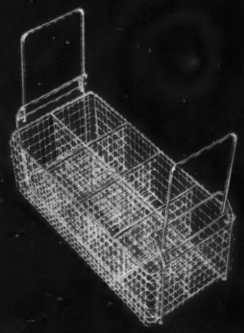


New Immersion Basket: The new glass basket for immersion dish washing machines and sinks, has 20 plastisol coated pegs 5½" high. The pegs are so shaped that they will accommodate almost any diameter shell glass from large ice teas to small juice glasses. Plastisol protects the glass and reduces noise. This basket has a cover which clips closed to hold glasses in place.

Metropolitan, the greatest name in racks, announces new products for more efficient—money saving mass feeding operations.

Another step forward in expanding the greatest line of wire products available to the mass feeding industry is exemplified by the introduction of these three new items by Metropolitan. Each product has been designed, engineered and fabricated to perform, outstandingly, a specific function; to last longer under severe operating conditions—and are offered at a very competitive cost.

For more detailed information about these items, write today. And remember, behind each Metropolitan wire product stands years of experience and years of service in meeting the needs of the mass feeding industry.



Stainless Steel Silver Basket: Another first by Metropolitan. Knowing that a plastisol coated silver basket left much to be desired, Metropolitan created and fabricated a compartmented basket of type 304 stainlesss steel—at a very competitive price. The 6 x 12⅛ x 4¾" basket contains a folding 11" handle. When the handle is folded, the basket can be placed on shallow shelves and cannot be tipped over by a dish-washing machine curtain. The compartmented feature assures thorough cleaning.

quality products of **METROPOLITAN WIRE GOODS CORP.**

N. WASHINGTON ST. & GEORGE AVENUE • WILKES BARRE, PA.

positive; menu control because of their year-round availability; the convenience of stock on hand; and quality control.

Better Sandwiches. A sandwich should look neat. For a neat and tasty spread, try mixing 1 pt. mayonnaise or salad dressing into 1 lb. butter, then chill. When cold, this spreads easily, adds flavor to the sandwich, and costs less than plain butter. Your method of slicing turkey, chicken, liver sausage, ham, tomatoes, and other fillings for sandwiches can mean the difference between profit and loss, especially where one slice does not cover the bread. Try using wedge-shaped slices. Start a slice (of tomato, for instance) about ¼ in. thick and angle the knife so that the slice is paper thin on the bottom side. For the next slice, start that paper thin and cut to ¼-in. thickness on the bottom side. Continue slicing wedges in this manner; you will have twice as many slices as if cut with even thickness. In making the sandwich, place the thick side of each slice to the outside of the sandwich, letting the thin sides overlap for a neat, even thickness.

Ways to Cut Cost. The article describes how replacement breakage costs and detergent costs were reduced in a chain of drive-ins. First, what a normal supply of chinaware and silverware should be at each particular unit was defined. Then a system of monthly inventory was put into effect. At the time the monthly inventory is received, it is compared with the pre-determined supply level and requisitions are filled accordingly. This accomplishes three things: (a) It allows management to know currently what the monthly breakage or pilferage is. (b) It insures that at least once each month the supply level in every unit is brought up to normal requirement. (c) There is never an over-abundance of replacement items at any unit, which insures that all replacement items are being fully utilized at all times and are not being handled in the careless manner which results from an over-supply. The detergent problem came from over-use. To solve it, portion control packages are being used in some cases. Although initially more expensive, they save money in the long run by their controlled use.

Selecting Adequate Seating. The type of operation, size of operation, and location must be considered to make a sound decision in selecting the proper seating. As an example, the author describes the seating necessary in a drive-in or roadside restaurant that has a coffee shop (to seat forty), a dining room (to seat seventy-five), and banquet facilities to accommodate at least fifty people. The advantages and disadvantages of the various counter heights and widths are discussed. The author recommends pedestal-type tables to be used with wall settees, which will allow pushing tables together to accommodate larger parties. Booths have their limitations. In selecting the seating for the dining room, a change in color will give a definite break. In planning a banquet room, allow approximately 10 sq. ft. per person to determine the size of the room necessary.

FOOD SERVICE MAGAZINE

Vol. 20, September, 1958

*Canned foods cut costs. K. B. Smith.—p. 33.
*How they saved $18,000 a year.—p. 34.
*Advanced course for fry cooks. J. R. Norris.—p. 58.

Canned Foods Cut Costs. Canned foods can mean big savings in time and labor for the operator. Preparation time is cut to a minimum, and portion control is brought to a new high. When you open a can of food, you know the number of portions it contains and the cost of each. To serve good food, purchase wisely. You may wish to see samples and establish your own specifications. Specifications are important. Specify the quality according to: the use to be made of the food; the count for certain fruits; the sirup, if important; the style of pack; and the variety, in some cases, such as freestone or cling peaches.

$18,700 Savings a Year! A cafeteria chain in the Greater Los Angeles area found that replacement costs for ordinary tableware were exceedingly high. In 1948, they switched to plastic dinnerware. They have found it stronger and lighter and that it has a longer life than their old tableware. It has also saved $18,700 a year in replacement cost. Another advantage of the plastic dinnerware is its lightness. California law prohibits female restaurant employees from carrying more than 25 lb. while on duty. Within this limitation, she can carry seventy-two plastic plates as compared with only twenty of the style formerly used.

Advanced Course for Fry Cooks. There are four elements basic to deep frying: the equipment, fat, food, and method. Electric fry kettles assure uniform products through accurate, automatic thermostat control and lightning-fast heat recovery. The electric pressure-fryer is a newcomer to the market. Foods are fried under 9 to 10 lb. pressure. Maintenance is no problem. The heating elements can be lifted out for easy cleaning, and stainless steel and other non-corrosive surfaces retain a like-new appearance for years. The fat used in frying determines, to a large degree, the quality of the finished product. Hydrogenated animal or vegetable fats, or a combination of both, are ideal for deep-fat frying. Fat should be strained or filtered at least once a day. Impurities can make a surprisingly big difference in the life of the fat and in its potential as a cooking agent. There's a prescribed temperature for each step in the frying process. Fat should be heated up to cooking temperature, not cooled down to it. Successful frying depends on pinpoint control in every step of the operation—from the fry kettle to the fat to the finished product.

FORECAST FOR HOME ECONOMISTS

Vol. 74, October, 1958

*The discussion method can be successful. H. Fleck.—p. 7.
*"Educating" tastes to school lunches. E. Snedeker.—p. 26.

The Discussion Method Can Be Successful. Discussion is a technique whereby a group examines a problem and attempts to reach the best solution. The problem being discussed must be of importance to every member of the group. The clue to many poor discussions is that the problem is too trivial. The function of a leader is to inaugurate, to guide, to direct, and to limit. Every participant must feel a responsibility for helping the group. A discussion can be successful only to the extent that everyone contributes what he can. The first step in a good discussion is to outline the problem clearly. Next, explanations or causes for the situation should be explored. Third, possible solutions should be examined. Last, the best solution should be selected and means of implementing it outlined. Other points must also be considered. Students should be encouraged to use sources of information with discrimination. Differences and issues must be uncovered. Sometimes a teacher is fearful of different points of view. Good questions will help to stimulate a discussion. The discussion method is valuable in that it gives individuals an opportunity to test their ideas and to see many angles of a problem, a belief, or an attitude. It helps us to respect the ideas of others and to appreciate different types of people.

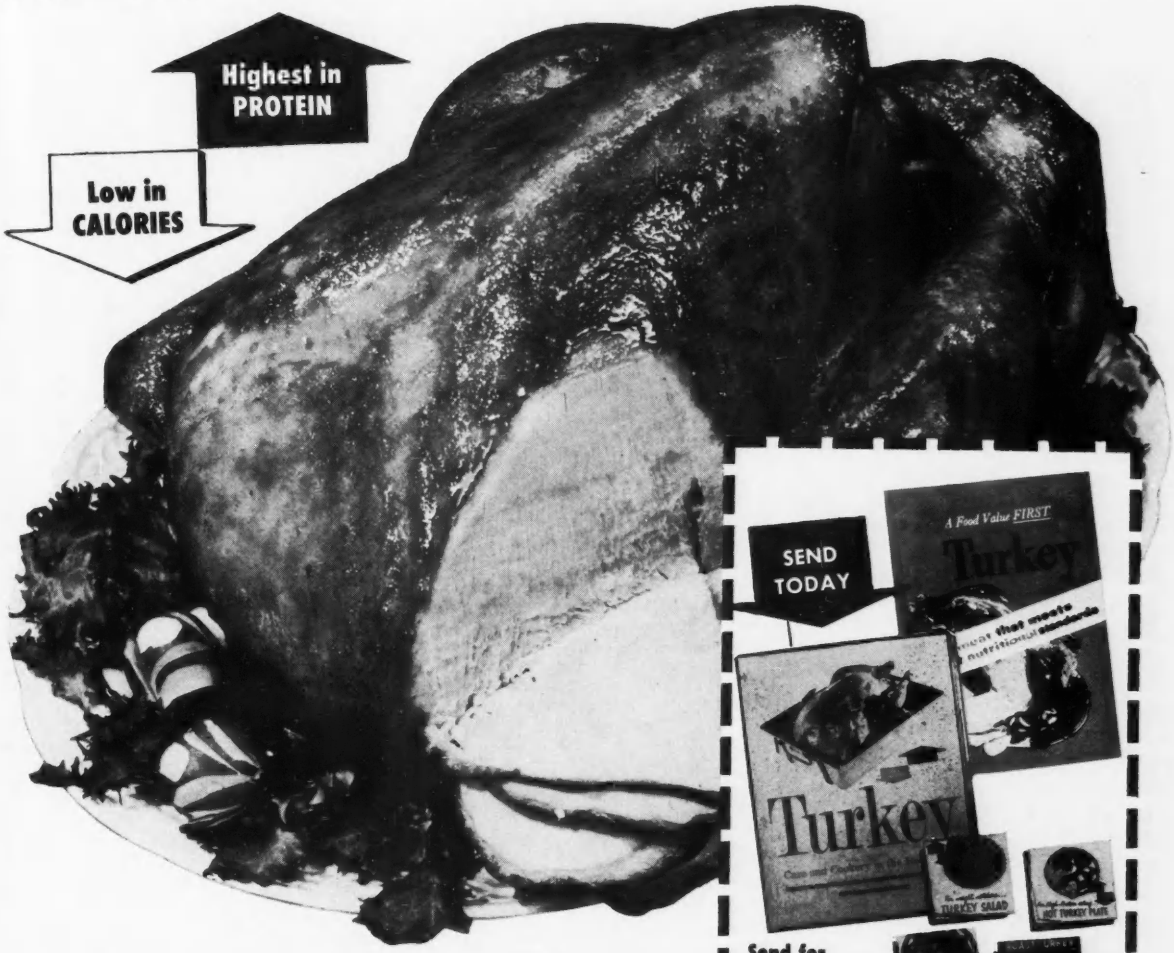
"Educating" Tastes to School Lunches. Encouraging youngsters to take full advantage of the well balanced and low-cost meals served in the school cafeteria is a real accomplishment. When it can be done we're educating children for better food habits. Two ways to capture and hold interest are by relating the school cafeteria menus to class work for the younger children and tailoring menus based on current teen food fads to "sell" the high school students. Since teenagers love anything that goes between a hamburger or hot dog bun, the plate lunch may be built around these. The favorites should be worked into the whole menu to achieve a hot, well balanced, and eye-appealing menu. Suggestions of menus which might appeal to teen-agers are included.

HOSPITAL MANAGEMENT

Vol. 86, November, 1958

*Citrus fruits mean more than orange juice for breakfast. D. H. Zumsteg.—p. 87.

Citrus Fruits. Citrus fruits have



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( ) "Turkey Care and Cookery in the Restaurant" . . . booklet on preparation and serving of turkey.

( ) New calorie-counter menu clip-ons featuring turkey in low-calorie dishes. (Samples free . . . only $1.00 for 300 of your choice.)

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many important attributes, but best of all is the fact that people like them and look for them on the menu. At breakfast, they are taken for granted. The current emphasis on the need of daily intake of ascorbic acid plus the importance of weight control for vigorous health make citrus fruits welcome at all meals. Of utmost importance to the food manager is the fact that citrus fruits have built-in portion control. The count of fresh oranges and grapefruit and quantity available of frozen citrus products is listed, as well as recipes using citrus fruits.

HOSPITALS

Vol. 32, September 16, 1958

*How to pep up entrées. I. L. Dolan.—p. 61.

*Cooperative scheduling meshes housekeeping-dietary functions. C. Kaufman.—p. 86.

Vol. 32, October 1, 1958

*Nine special dietary services that build good will. W. V. Mays.—p. 86.

How to Pep Up Entrées. With a great deal of the dietitian's time spent on modified diets, the author feels that "house" diets are neglected in many hospitals. She believes there is a need for more variety in house diets and offers in this article practical suggestions for adding flavor and texture contrasts to hospital entrées. Recipes include ham timbales with peaches, spicy raisin sauce, and elegant turkey dressing.

Meshing Housekeeping-Dietary Functions. Close understanding between the housekeeping and dietary departments is most important to the over-all smooth functioning of the hospital. Even though they are strictly individual departments, there is a close working relationship between the two. The author describes procedures used at Michael Reese Hospital in Chicago which have led to a more efficient and satisfactory system.

Dietary Services that Build Good Will. Special services are today part of hospital routine, and the hospital dietitian has an obligation to take her share of this added load. Some of the services which the dietary department might provide are selective menus, visits to patients by the dietitian, dining rooms for ambulatory patients, birthday and anniversary cakes for patients, tray covers and napkins, special dinners for various groups within the hospital, and weight control programs for employees. Another job, which would create much good will for the hospital, would be catering for special functions. This should not be overdone, however. Dietary departments are not catering services; they have enough responsibility taking care of patients. Nevertheless, much can be said for catering, particularly for the hospital's public relations groups, such as the board of trustees and the women's auxiliary. It will give them an opportunity to get the "feel" of the hospital.

HOTEL MONTHLY

Vol. 66, September, 1958

*Specializing in turkey dishes builds big business.—p. 45.

Specializing in Turkey Dishes. The article describes a Midwest operation. As the title implies, the restaurant specializes in turkey dishes, although it does include steak and other non-turkey items on the menu. An important feature of the success is the good merchandising job done on the menu. Each item is described in a manner which activates the taste buds. A turkey pie, for instance, becomes "Our Famous All-Meat Pie, baked in a crispy, golden brown crust, surrounded by luscious chunks of turkey." The most popular item on the menu is the hot turkey sandwich served with dressing, potatoes, cranberries, and a side dish of gravy, which is available at both lunch and dinner. Carry-out sales of turkey dishes include all items listed on the menu and range from sandwich to complete dinners, calling for one or more whole turkeys. Careful attention to details characterizes this operation, as it does most successful food services.

THE MODERN HOSPITAL

Vol. 91, September, 1958

*Train your own conference leaders. L. Nadler.—p. 93.

*Freeze precooked foods for future use. D. Zumstez.—p. 134.

Vol. 91, October, 1958

*Food distribution technics are changing. J. W. Stokes.—p. 112.

Train Your Own Conference Leaders. A good conference leader does not lecture to a group or attempt to teach. His function is to draw the various members of the group into a discussion of ideas and to channel that discussion into fruitful channels. A hospital need not hire an outside person to be a conference leader; someone already on the staff in a supervisory capacity can be trained to act as a conference leader. If the hospital has the funds available, the potential leader can be sent to workshops and other meetings, where he can learn the proper skills. If money is scarce, there is ample literature to help sharpen conference techniques. Once you have a conference leader, there are still many factors to consider when planning a conference series. These include: location, time, make-up, of group, among others.

Freeze Precooked Foods for Future Use. Well planned utilization of on-premises freezing can be a great help in simplifying the work load. Freezing foods may not be necessary all during the year; it may be practical only in advance of week-ends or the busier seasons, during vacations, or in anticipation of the need for holiday specialties. On the other hand, freezing of precooked foods can afford economies in some operations where seasonal foods are cheap, freezer space is on hand or available at reasonable cost, or where the work load is such that the cook can prepare twice as many casseroles at one time during the week, freeze half of them, and have them available for use when the staff is limited over week-ends or at night. Menu variety is improved by freezing, too. Recipes, methods of packaging, and storage temperature are discussed.

Food Distribution Techniques. Centralized and decentralized methods of food service in hospitals are discussed. The advantages and disadvantages of each method are pointed out. Much depends on the human equation. Any system, whether centralized or decentralized, can be made to work, if sufficient trained personnel and adequate supervision are available. Each hospital differs with respect to such factors as physical structure and lay-out of buildings; financial resources and administrative policies; needs and economic status of patients. The best method of food distribution is the one that most adequately meets the needs of a given institution. A careful study of the needs and conditions existing in the hospital should be made before a system of food distribution to patients is chosen. The great need is for an experienced, objective, outside point of view. The investment required in new equipment is usually of such magnitude that calling in an outside consultant is justified.

RESTAURANT MANAGEMENT

Vol. 83, October, 1958

*Uniformity: key to success. C. A. Rovetta.—p. 53.

*Needed: a year-around program for fire prevention. A. and G. Eiss.—p. 57.

Uniformity: Key to Success. The one quality that a restaurant needs most to appeal to the eating-out public is uniformity. If you turn out good products, you will attract customers. If you serve good products sometimes and not so good at other times, you will not only lose repeat business but damage your reputation. The best way to achieve uniformity is through greater use of pre-processed, pre-prepared foods. Baking mixes, for example, greatly simplify baking operations and reduce the problem of untrained employees. Where you can get a pre-prepared item, it's almost always advantageous in terms of costs—if you figure total costs.

Fire Prevention Program. The best fire insurance for a building is built in. When building or remodeling, you have a splendid opportunity to include fire-resistant features in the building which, while not designed to prevent fires, can keep fires from spreading. Ten rules for fire safety are: (1) Build in fire protection. (2) Keep your place clean and neat. Don't let grease and rubbish accumulate. (3) Store flammable materials carefully. (4) Use properly sized fuses. Overfusing and pennies are "out." (5) Clean and inspect your heating system periodically. (6) Provide smoking facilities for employees. Matches and butts in

Left to right: Colebrook,* Seneca,* both Oneida* Hotel Plate; Accent,* Oneidacraft* DeLuxe Stainless; Sand Dune,* Oneida* Stainless

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waste baskets are dangerous. (7) Provide enough fire extinguishers. (8) Call the fire department immediately if fire starts. (9) Train employees in the proper use of equipment. (10) Provide for fire warning when the restaurant is closed.

VOLUME FEEDING MANAGEMENT

Vol. 11, October, 1958

*How to use dried fruit. I. L. Dolan.—p. 12.
*Hearty soups . . . meal makers. E. Blair.—p. 20.
*Cooking with steam. M. Cummings.—p. 36.
*Product evaluation report: pot and pan washing machines.—p. 53.
*Wall signs . . . constant reminders.—p. 68.
*Cheddar . . . the cheese of profitable variety.—p. 70.

How to Use Dried Fruit. There are more uses for dried fruit than you may think. Their low cost per portion, distinctive flavor, and textures recommend them for salads, hot breads, sauces, desserts, sandwich fillings, and entrée accompaniments. While raisins and prunes are the major crops, dried figs, apricots, peaches, pears, and apples are also inexpensive, easy to handle and prepare. Any of them can "spice up" breakfast, lunch, and dinner dishes. Suggestions for serving dried fruits in fresh fruit salads and to perk up entrées are presented, along with recipes.

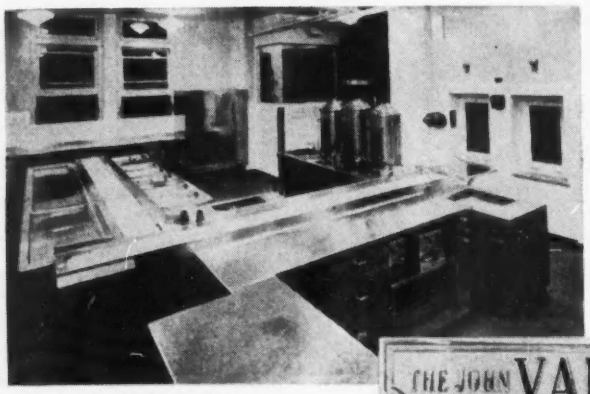
Hearty Soups Are Meal Makers. Sturdy, satisfying soups are popular and profitable. They are low in cost, quickly served, and a "cinch" to merchandise. Make the star attraction on your noon-time menu a luncheon combination with soup as the mainstay of the meal. Team it with a salad or dessert, a sandwich, or something interesting in the way of crackers or bread. Build your features around thick soups, such as beef-and-vegetable, New England clam chowder, or split pea soup enriched with sliced sausage, bits of diced ham, or crumbled bacon. With so many good canned soups and prepared soup bases at hand, soup-making today doesn't need to involve a long tedious process. In hurried kitchens, the stock needed as a base for certain varieties of soups can be quickly supplied by canned bouillon, a soup base, or commercial beef and chicken concentrates. Most prepared soups respond to imaginative, individual treatment. Take these soups and season, combine, add to, or garnish as you desire.

Cooking with Steam. Steam provides an easy, safe, economical, and nutritious way of cooking nearly any type of food. Steam can be used to cook meats, fish, poultry, eggs, vegetables, spaghetti products, fruits, and even some breads and cakes. Vegetables do not lose their vitamins and minerals to any great extent when steamed, and they retain their color as well. Cooking meat and poultry in steam retains moisture and flavor. Also, the yield will be higher.

Pot and Pan Washing Machines. A properly used machine can wash pots and pans cleaner, as well as faster, than its human counterpart. There are three basic types of pot washing machines: (a) the batch type, (b) the two-door pass-through, and (c) the two-tank, continuous rotary table machine. All employ carefully directed jet streams of wash solution and rinse water to remove the soil. The machines are designed so that either the spray or the pots move. All types feature automatic and manual control of the wash and rinse cycles. The original, single-tank, batch-type unit is most widely used today. Pointers on what to look for when buying a machine include its size, construction features, and cleanability.

Wall Signs as Constant Reminders. Employees, especially new ones, need constant reminders of the small, but important details of their jobs. Brief messages posted in the kitchen and other work areas will help to prevent their overlooking details or making expensive mistakes, not only in cleaning up but also in their routine work. In preparing signs, remember: lettering should be large for easy reading; pick the spot carefully; make the sign brief and to the point.

Cheddar Cheese. Frequently called "American," Cheddar cheese accounts for 80 per cent of all cheese made and used in the U.S. And deservedly so, since it is available in many types and strengths, making it adaptable for innumerable uses.



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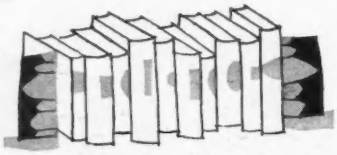
CONTINUING EDUCATION



by R. Bruce Kirk, Ph. D.

THE CONTINUING education services program was set up in response to needs felt by The American Dietetic Association. These needs were investigated by a committee which finally recommended (Annual Reports and Proceedings 1955-56, p. 34) that an office of continuing education services be set up with a full-time director. This was done, and Bessie Brooks West, for about a year, occupied the position of Director of Continuing Education Services. During this time, Mrs. West made a number of inquiries into the needs of the organization. She also sent out a questionnaire from which she was able to ascertain some of the main wishes of the members and some of the ways in which they would like those wishes fulfilled. Finally, the wide acquaintance which Mrs. West had among the membership, her experience in many aspects of the dietetic profession, and her personal visiting of a number of states helped her to establish in her thinking the kind of program which she would like to carry out. It was at this time, however, that she had to return to Kansas State University to continue with her duties there. The position of Director was then left vacant for some months.

As a result of the A.D.A. communications workshop held in February 1958, in Hinsdale, Illinois, the present Director became very much interested in The American Dietetic Association, in the question of improving communication, and in the maintaining of the continuing education program. He had been told by Mary Holtman of the National Project in Agricultural Communication of the vitality of A.D.A., of the professional attitude of the members, and of the willingness of its leadership to adapt to a changing situation. He also had met the Headquarters staff and was much impressed by their understanding of and willingness to work for the good of the whole organization. In addition, he had read some A.D.A. pamphlets, some copies of the JOURNAL, and some copies of the *Courier*. In these, a high standard of scholarship, coupled with an increasing emphasis on continuous professional improvement, was apparent. Consequently, when the then President, Dr. E. Neige Todhunter, asked him at the Executive Board meeting in June 1958 to serve as Continuing Education Services Director, the idea was not quite as new and as startling as it would have been, had he not had this earlier experience with the Association. In August of this year, he joined the Association's headquarters staff at 620 North Michigan Avenue.

Purposes

The purposes of the continuing education program may be described under three headings: graduate study, adult education, and communication. In all three areas, the main purpose is to apply the best techniques of problem-solving which psychology and education can supply. The talents and resources of the Association seem to be more than adequate for the discovery and handling of its needs and opportunities. The gathering of information, evaluating it, and disseminating it so that it will be of most use to the whole membership will occupy much of the time. Full cooperation with all officers, state presidents, section chairmen, and Headquarters staff will make the program much more likely to succeed. In addition, a new organizational set-up has been developed.

A New Step

When your present director came to the organization, his main interest first was, of course, to become oriented. In conversation with Mrs. West, he realized that no one person could cover the whole country; yet there seemed to be the need for some sort of coordinating of the different aspects of this continuing education services program. It also seemed that it might be a good idea to combine the efforts of a number of states into a kind of regional organization. Gradually, out of this practical need, there grew the concept of continuing education services "regions" to be directed in each case by a member of the organization. This suggestion was made to the Executive Board at the Annual Meeting in Philadelphia. Much discussion followed in the Coordinating Cabinet, containing, as it does, the people who would be closely concerned with such a development.

This discussion led to the actual setting up of eight regions throughout the country. Each is to have a continuing education services representative. These eight representatives will work with the national director under the supervision of the Education Section Chairman. Also, there will be a very close interest in the work of the other Sections. As this is a new venture, we have not yet spelled out its complete functioning. One thing, however, is sure. The function of this continuing education services organization will be primarily that of consulting with and helping the individual states. It will also exist to help individual members where possible.

The regions and their representatives are as follows:

REGION I: Alaska, California, Hawaii, Idaho, Nevada, Oregon, Washington. *Representative*—Elsie L. Bakken, King County Hospital System, Seattle.

REGION II: Montana, Nebraska, North Dakota, South Dakota, Wyoming. *Representative*—Marjorie Morrison, U.S. Children's Bureau, Denver.

REGION III: Arizona, Colorado, Kansas, New Mexico, Oklahoma, Texas, Utah. *Representative*—Mary Ellen Johnson, Colorado State Hospital, Pueblo.

REGION IV: Illinois, Iowa, Michigan, Minnesota, Missouri, Wisconsin. *Representative*—Grace L. Scholz, VA Hospital, Hines, Illinois.

REGION V: Alabama, Arkansas, Florida, Georgia, Louisiana, Mississippi, Puerto Rico, South Carolina. *Representative*—Mary Gereraldine Getty, Little Rock.

REGION VI: Delaware, Kentucky, Maryland, North Carolina, Tennessee, Virginia, West Virginia. *Representative*—Geraldine Piper, U. S. Public Health Service, Charlottesville, Virginia.

REGION VII: Indiana, New Jersey, New York, Ohio, Pennsylvania. *Representative*—Regina Frisbie, Kellogg Company, Battle Creek, Michigan.

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REGION VIII: Connecticut, Massachusetts, Maine, New Hampshire, Rhode Island, Vermont, *Representative*—Harriet Wright, University of Massachusetts, Amherst.

It is believed that the representatives, located as they are, close to the states with which they are concerned, will be most closely aware of the problems, the best times of meeting, the resources, and all other aspects of the continuing education services program within the region. Thus, in conjunction with the national director, they will, it is hoped, provide a real service to the members of *The American Dietetic Association.*

Graduate Study

Throughout the nation the level of educational achievement as a requirement for employment, or for promotion after employment, has risen steadily. From the *1958 Handbook on Women Workers* (1), we find that the percentage of total degrees conferred on women has risen from 17 per cent in 1890 to 34 per cent in 1957. That is, relatively twice as many women are receiving degrees as received them back in 1890. This, however, is only part of the picture. It is also true that there is an increasing urgency for all professional people to further improve themselves beyond the time of the receipt of first degree. This usually means graduate study. Dr. Mary Fuqua and Margaret Warde presented at the Annual Meeting in Philadelphia many of the findings of their committee on the availability of fellowships and scholarships for members of the A.D.A. and others interested in furthering their professional training. In addition, they indicated willingness to help people who might be planning to enter a graduate program.

A graduate program has at least two basic emphases. First, there is the need for understanding people and of handling departments in a way that is satisfactory to the institution of which they are part (for example, the department of dietetics of a hospital). There is increasingly brought to mind the need for administrative ability and the ability to communicate not only with one's own department but also adequately with other departments and with the administrator of all departments. To meet this need, which is felt not only in The American Dietetic Association but also in many other organizations and associations, many universities are now offering such courses in their graduate schools. The other emphasis is on the "brushing up" of one's own subject, i.e., becoming acquainted with some of the newer findings in nutrition, chemistry, and other subjects related to the profession of dietetics, so that one is able to converse with some ease and assurance on the present theories and applications in the field.

Another area which is not necessarily emphasized and yet has some importance is that of rounding out an education in the arts, literature, and other areas which are required in modern life.

Here, then, are at least three areas: administrative skills, new awareness of one's own subject, and information within the liberal arts curriculum. The purpose of the continuing education services, then, will be to help any members (together with the Committee on Graduate Study) in setting up programs which are suitable both for their time and needs.

Adult Education

This, as distinct from graduate study, is concerned with professional improvement which will not necessarily lead to further academic recognition. It often is received in institutes, workshops, short courses, and other programs which are fitted into the working time of the member. The advantage of such programs is that it does not require full-time work for a half-year or a year, but can be managed by people who continue with their employment while obtaining this further improvement. So great is the need for this kind of program that many universities are already setting up many courses for people who are fully employed. To name but a few, the University of Michigan, Michigan State University, Louisiana State University, University of California, University of Washington, New York University, University of Minnesota, and many others have, for some years, offered such programs. Some of our own members have offered short courses which are suitable because they both cover subjects that are essential and are geared to the timetable of the individual. One question which arises out of this kind of program is: "Can individual members take such courses and still obtain credit toward further academic recognition?" This whole area is one into which we shall inquire. We know that University Extension Services are working on such programs.

The next question grows out of this: What about the members who are not close enough to universities, and who are still interested in further promoting themselves professionally? It would seem that here the continuing education services regional representatives might offer help in evaluating work which is done for publication and, with the help of editors and members of university faculties, might suggest improvements so that such professional growth might be achieved through published articles. In any case, the adult education program is a wide one and the setting up of institutes, workshops, and other programs will be the concern of the continuing education services program.

Communication

"If all our days were playing holidays, to sport would be as tedious as to work." Shakespeare here points up a well known fact that familiarity with the subject and constant exposure to it may easily dull the appetite for it. We have heard a great deal about communication in the last few years. There may be, on the part of some, a tendency to feel that it is overdone. Yet it is an important subject and one which cannot be neglected. Whether spoken or written, faulty communication has often been the source of handicap and difficulty rather than what it should have been—a source of facility and ease in achievement.

Business and industry have recognized, as did the academic world earlier, that by improvement of the techniques of communication, many costly errors could be eliminated. Directions could be made more clearly. The stress and strain on the organization could be lessened. Emotional upsets could be avoided. A sense of teamwork could be increased. People without a great deal of training could be reached more effectively. Well trained people

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could make better use of their training if they improved their way of getting messages to other people. So true did this prove that costly programs for communication improvement have been undertaken in most of the large industries and by most of the large private companies throughout the country. Government agencies also have thought it wise to set aside time and money to improve communication. There is scarcely an issue of any magazine of importance in the last few years which has not had some reference to the need for improved communication. Even the parodies have served to point out that it occupies a great deal of our time and thinking. Public relations people, advertising agencies, employment agencies, labor organizations, professional associations of all kinds, and a host of others have recognized that there is a real gain to be made if we clarify what we want to convey, improve the channels of communication, and allow for more than one way of communication to exist.

The American Dietetic Association has not been unaware of this need for improved communication. June Bricker's "Communications Corner" in the A.D.A. *Courier;* articles on communication in the JOURNAL; speeches about communication at a number of annual meetings; workshops on communication—all have been aimed to point up the need for an efficient communication network within the organization. Thus, it is not to begin but to continue the good work already begun that the continuing education services program will apply itself. Here, as in adult education, some of the techniques and skills can best be presented in the group situation. By actually seeing the thing work, individuals are able to appreciate the contribution that it can make. "Buzz sessions," psycho-drama, sociodrama, "brainstorming," case studies—where any or all are most applicable—can best be seen at work at a time which has been set aside for a specific study of the subject. Numerous reports have already been made of outgrowths of the February workshop referred to earlier. Wisconsin, Washington, D. C., and California (to name but a few) have reported that at least partly as a result of the workshop, they have gone ahead with further development in their own localities.

One aspect of this whole matter which perhaps is not entirely appreciated is that in viewing problems and seeking opportunities in this special group situation, there is often introduced an objectivity and a relaxation which is not possible in the ordinary everyday situation. New ideas from new persons often stimulate new ideas in one's self. Freedom to express one's ideas in a non-critical situation and to have these ideas evaluated by a nonpunitive audience has served very greatly to add to the creativity of the group and of individual members. This is one aspect of the special group situation which must not be underrated. Our continuing education services will do all that is possible to help improve verbal and written communication throughout the whole organization.

Reference

(1) 1958 Handbook on Women Workers. U.S. Women's Bureau Bull. No. 266, 1958.

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BIOGRAPHICAL NOTES FROM THE HISTORY OF NUTRITION

Sir James Lancaster—1554?–June 6, 1618

There is always difficulty in trying to prove who was the first person to use some new treatment or procedure. This is certainly true with regard to the use of citrus fruit in the treatment of scurvy. However, James Lancaster is credited with being the first commander of sea-going vessels to use lime juice as an antiscorbutic.

Little is known about Lancaster's background. He was born in the parish of Basingstoke in Hampshire, England, either in 1554 or 1555. Nothing is known about his parents, but one writer of the period described him as being "by birth of gentillity." He spent part of his early life in Portugal, because he is recorded as saying of the Portuguese, "I have bene brought up among this people: I have lived among them as a gentleman, served with them as a souldier, and lived among them as a merchant."

In the year of the Spanish Armada (1588), Lancaster was in command of a merchant ship, *Edward Bonaventure*. He commanded this same ship three years later on a voyage to the East Indies to trade in spices and prey on the ships of the all powerful Portuguese merchantmen. One can only speculate as to where and how Lancaster learned navigation and seamanship. The records of this and subsequent voyages show him to be an able leader and concerned for the welfare of his men. His first voyage was not financially profitable, but he soon obtained support for a second voyage to raid a port in Brazil and to capture such Spanish and Portuguese merchantmen as he might encounter. What today we frankly call piracy was viewed more favorably in the Elizabethan days!

The voyage was a financial success, but we do not hear of Lancaster again until four years later when he was given command of a fleet of four ships financed by the merchants of London to establish trade in the East Indies. The record of this voyage says "very many of our men were fallen sicke of the scurvey in all our ships, and unless it were in the generals [Lancaster's] ship only, the other three were so weake of men that they could hardly handle the sayles." The reason the men on Lancaster's ship were in better health was: "He brought to sea with him certaine bottles of the juice of limons, which hee gave to each one, as long as it would last, three spoonfuls every morning, fasting; not suffering them to eate anything after it till noone"

James Lancaster was knighted after his return from this voyage. Because of poor health, he did not sail again with the next fleet, but he continued as an adviser to the growing East India Company.

Lancaster lived in London and remained a bachelor. Little is known of his life, and one wonders where he learned about antiscorbutics. In the description of his third great voyage, we read "our men began againe to fall sicke of the scurvy" and they put into a bay in Madagascar "there to refresh our men with oranges and limons, to clear ourselves of this disease".

Quiet efficiency and modesty were Lancaster's characteristics; all his voyages were most carefully planned and every contingency including scurvy was provided for.

REFERENCE: The Voyages of Sir James Lancaster to Brazil and the East Indies, 1591-1603. Introduction and notes by Sir William Foster. London: The Hakluyt Society, 1940.—*Contributed by E. Neige Todhunter, Ph.D., Dean, School of Home Economics, University of Alabama, Tuscaloosa.*

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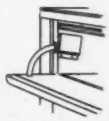

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USDA Research Proposed. More research on the role of fats and fatty acids in human diets was recommended by the USDA's Food and Nutrition Research Advisory Committee which met in Washington, November 3 to 5. The Committee stressed the need for determining the exact nature of human metabolic response to different types and amounts of fats and fatty acids and the relationship between fat needs and age and other elements in the diet. A study of fats and other lipid contents should embrace the whole range of foods, the committee said, and better methods of determining the amounts and kinds of fats and oils in foods are also needed.

The Committee reiterated the importance of developing better estimates of the amounts of fat lost in food preparation in both household and institutional kitchens. It was pointed out that the validity of statistics on per-capita food consumption will remain in doubt until it is known how much fat is actually consumed.

The Committee also attached importance to the problems of pesticide residues in agricultural products and finding methods of preventing insect infestation of processed foods.

Other work felt to have high priority by the Committee included:

(a) Efforts to obtain better statistical information on food consumption and dietary levels, including data on the diets of individual members of households, and of men, women, and children as population groups.

(b) Determining human requirements for protein, B-vitamins, and minerals and developing new approaches for evaluating the adequacy of protein nutrition.

(c) An effort to improve the translation of research findings into practical application.

Dr. Eliot Honored. The American Public Health Association, at its annual meeting in October in St. Louis, honored Dr. Martha May Eliot, formerly Chief, U.S. Children's Bureau, by presenting to her the Sedgewick Memorial Medal. It is given for "distinguished service in public health." Dr. Eliot is now Head, Department of Maternal and Child Health, Harvard University School of Public Health, Boston. She is an honorary member of A.D.A.

Fellowships and Scholarships. At the *University of Massachusetts*, Amherst, a fellowship amounting to $1800 will be granted this year to a New England student registered for graduate work in nutrition. Made possible by a grant from the Charles H. Hood Dairy Foundation, the fellowship enables the holder to carry a full graduate program of study toward a master's degree. Candidates should have an undergraduate major in foods and nutrition, biologic sciences, or biochemistry, and an academic record above average. Applications should be sent before March 1 to Helen S. Mitchell, Ph.D., Dean, School of Home Economics, University of Massachusetts, Amherst.

Grants for four annual scholarships of $250 to be awarded by four schools —Cornell University, Michigan State University, City College of San Francisco, and the Culinary Institute of America—were announced at the recent meeting of the *National Association of Hotel and Restaurant Meat Purveyors*. The awards will be made without regard to race, religion, or national origin to a deserving student in food administration in each institution.

Plentiful Foods MONTHLY LIST

The following foods are expected to be in plentiful supply during January, according to the USDA:

Apples
Chickens—broilers and fryers
Dates
Peas—canned and frozen
Potatoes
Vegetable fats and oils
Walnuts

The most recent issue of *The National Food Situation*, published by the USDA in November, predicts that beginning early in 1959 supplies of most foods are likely to be somewhat higher. Demand for food is expected to continue strong throughout the year ahead, with retail prices averaging a little under those of 1958 because of heavier supplies.

More livestock on farms and ranches as of January 1 was expected than last year, and a large pig crop next spring should result in a sharp increase in pork production this year. Beef cattle numbers are expected to increase further this year, and slaughter of beef cows and cattle "off grass" will continue low. Sales of cows and heifers from dairy herds for meat will likely be down some in 1959. However, slaughter of grain-fed animals will probably continue relatively high. Total beef production in 1959 is likely to be about the same as in 1958.

Civilian consumption of meat per person this year should be a little larger than last, the increase being principally in pork. For other kinds of meats, rates will be close to those in 1958. Increased consumption is also in prospect for chicken, canned fish, fresh citrus fruits, potatoes, and dry beans. Prospects are for heavier production of processed citrus after January 1 with more frozen concentrated juice and about as much canned single-strength juice per person in 1959 as in 1958. For other major food groups, little change from 1958 consumption rates is anticipated.

Frozen Foods to Use in January. From the National Association of Frozen Food Packers come the following recommendations for the month of January.

FROZEN FRUITS AND DESSERTS

(all available in 30-lb. cans as well as some smaller sizes)

Apricots—for breakfast fruit and low-calorie, high-vitamin desserts, as well as for fruit puddings

Apples—for pies and for applesauce to accompany roast pork or pork chops

Blueberries—for muffins, pies, and cobblers

Strawberries—for whips and sundaes with a summertime flavor

Dessert pies (available in individual sizes as well as family-size)—for variety in pleasing winter-sharpened appetites

FROZEN VEGETABLES

Green beans (available in all sizes of containers)—for texture and color contrast on the dinner plate

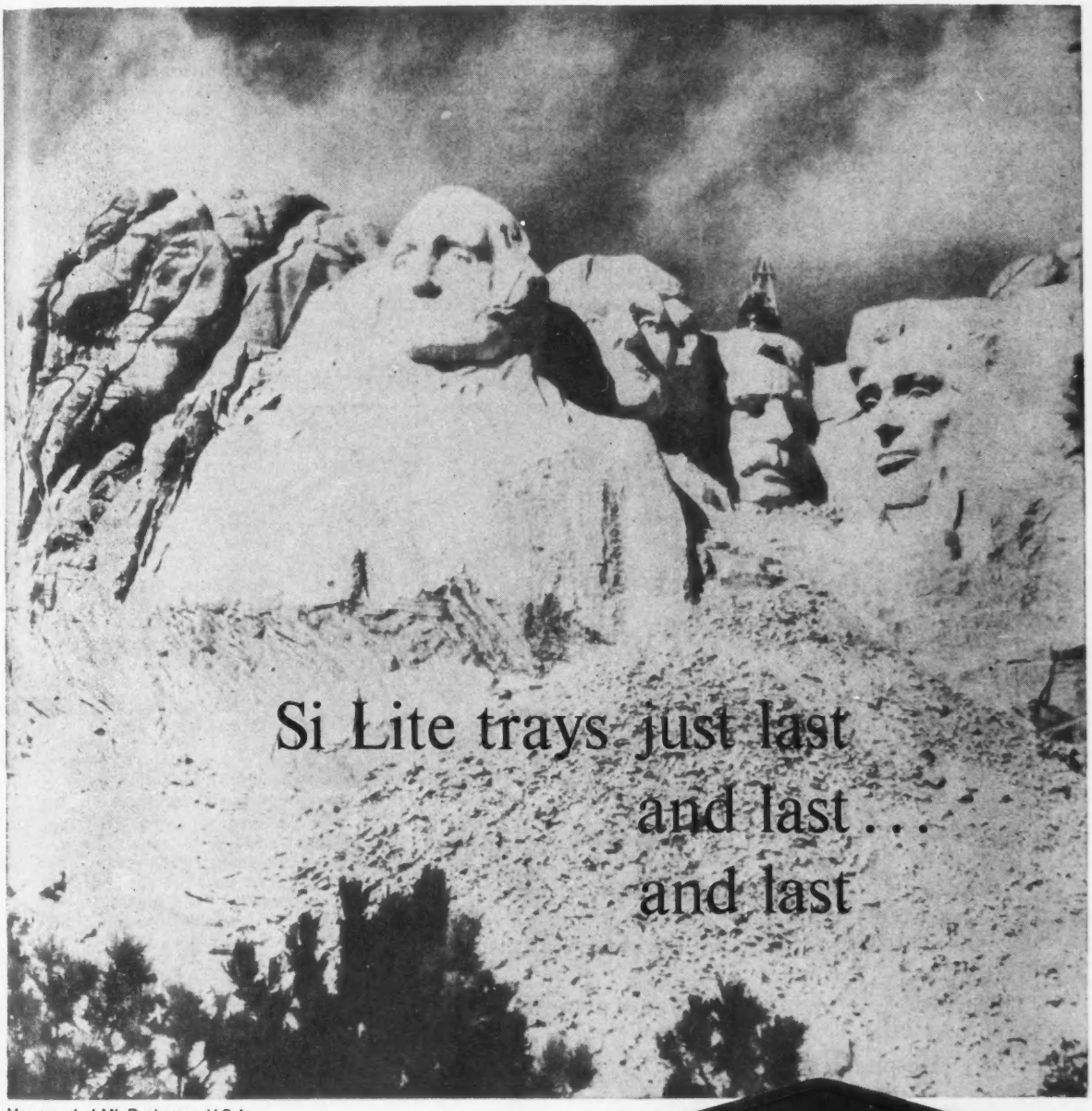
Corn (available in all sizes of containers)—for variety, combine with green pepper and onion or with mushrooms

Peas (available in 50-lb. containers; others, 2½ lb.)—for standard menus. Don't over-cook or allow to stand on the steam table. Properly cooked, peas add delicate sweetness and color to a dinner plate and build your reputation for high quality foods.

Potato products (available in 30-lb. and smaller containers)—for meeting every potato taste—hashed browns, whipped, French fries, potato puffs, and so on.

Institute in New Orleans. February 23 to 27 are the dates set for an Institute on Dietary Department Administration to be conducted by the American Hospital Association in cooperation with A.D.A. The program has been developed to allow participants to explore better ways of administering dietary departments and the practical application of these methods for good patient care. It is planned for persons concerned with the management of dietary departments—executive staff, dietitians, supervising heads of dietary departments, and nutritionists in hospitals and in public health. Further information may be obtained from the American Hospital Association, 18 East Division Street, Chicago 10.

Workshop in Georgia. From March 4 to 6, a conference on "Better Foods for Better Nutrition" will be conducted at the University of Georgia's Center for Continuing Education in



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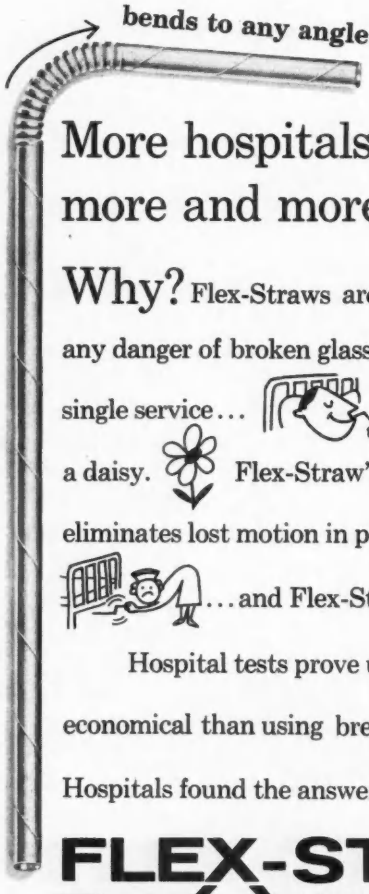
Athens. The Divisions of Foods and Nutrition, and Food Processing will act as co-sponsors of the meeting. The program is being planned for persons engaged in research, extension, and teaching of foods and nutrition, and special attention will be given to industrial and institutional problems in processing, handling, and serving foods.

Texas Seminar. On December 5 and 6, a seminar for dietitians with emphasis on pediatrics was presented in Dallas, at the University of Texas Southwestern Medical School, with the co-sponsorship of the University of Texas Postgraduate School of Medicine. Guest speaker was Dr. Margaret A. Eppright, Professor of Home Economics, The University of Texas, Austin; discussion leader for the seminar was Dr. Florence I. Scoular, Dean, School of Home Economics, North Texas State College, Denton. The program given by members of the Medical School faculty and Dr. Eppright, included:

"Normal Nutritional and Growth Requirements"—Dr. Eppright
"Normal Patterns of Growth and Weight Gain"—Dr. Chester Fink
"Structural Defects of Gastro-Intestinal Tract"—Dr. George Dorman
"Mineral Requirements"—Dr. Donald Cheek
"Protein and Amino Acid Requirements"—Dr. Edward L. Pratt
"Essential Fats and Fat Metabolism"—Dr. William W. Burr
"Psychogenic Nutritional Problems"—Department of Psychiatry
"Anemias"—Dr. Teresa Vietti
"Malabsorption States"—Dr. Ben P. McCarley
"Inborn Errors of Metabolism"—Dr. Percy E. Luecke, Jr.
"Juvenile Diabetes"—Dr. Edwin L. Rippy
"Nephritis and Nephrosis"—Dr. John A. James
"Toxic and Allergenic Substances Contaminating the Average Diet"—Dr. Frederick W. Grover
"Skin Manifestations of Dietary Abnormality"—Dr. Coleman C. Jacobson



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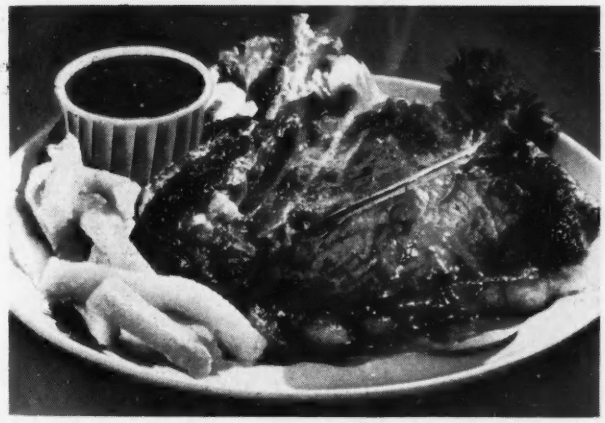
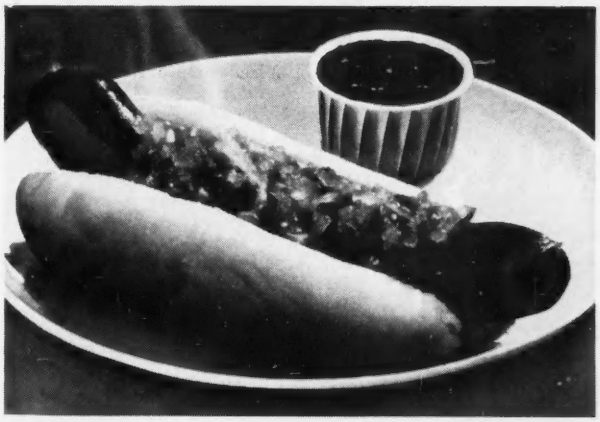
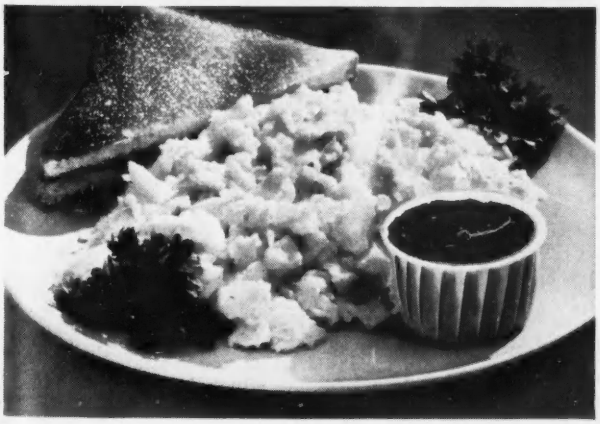
Examinations for Nutritionists. The American Board of Nutrition will hold examinations for certification as a Specialist in Human Nutrition during the week of April 12 to 18 in Atlantic City. Candidates who wish to be considered for these examinations should forward applications to the Secretary's office not later than March 1. Application forms may be obtained from the Secretary, Dr. Robert E. Shank, Department of Preventive Medicine, Washington University School of Medicine, St. Louis.

USDA Publications. How shoppers can use U. S. grades in buying food is explained in a new, sixteen-page pamphlet, "Shopper's Guide to U.S. Grades of Food," issued by the USDA as Home and Garden Bulletin No. 58. It lists all consumer grades for food as well as some wholesale grades and explains the meaning of each. Suitable uses for some of the foods of different grade are suggested. A handy chart, "U.S. Grades at a Glance," lists the grades opposite each commodity to which they apply. Single copies may be obtained from the USDA Office of Information, Washington 25, D. C.

Poultry Availability and Merchandising in Retail Stores is the title of the USDA's new Marketing Research Report No. 265. In it is reported a survey of some 6300 retail food stores, designed to represent 93 per cent of all such stores in the U.S. and selling an estimated 63 per cent of the dollar volume of food sold at retail. Chains with eleven or more stores were excluded. Only 54 per cent of the stores surveyed sold fresh broilers and fryers, with the proportion about the same in all major regions of the country, although it was higher in large cities than in small towns and rural areas. Frozen broilers and fryers were carried by 36 per cent of the stores in the survey, the highest proportion being in the West and the lowest in the South. Frozen or fresh turkeys were sold in about a fourth of the stores, about half of which sold them only during the holiday season. Poultry items of all kinds were carried in more large than small stores. The USDA Office of Information,







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Heinz

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Washington 25, D. C., will send single copies to readers on request.

A third new USDA release is Farmers' Bulletin No. 2125, "Making and Preserving Apple Cider." In it the problems of selecting and blending the apples, grading, washing, and grinding the fruit are discussed, as are aspects of preserving cider, including refrigeration, freezing, and pasteurizing. Other topics covered are: cider containers, plant and equipment design, sanitation, and fly control. A number of photographs and line drawings illustrate methods and equipment used both in processing apples for cider and for pasteurizing the resulting product. Copies of this sixteen-page leaflet may be ordered for 10 cents each from the Government Printing Office, Washington 25, D. C.

Civil Defense Booklet. *The Home Economist in Civil Defense* is the title of a booklet by Helen Bosard, University of Alabama, prepared for the Alabama Home Economics Association in cooperation with the state Department of Civil Defense. Included in the basic information is a list for a fourteen-day supply of food and other supplies. The booklet points out that home economists will be key people in emergencies in helping Civil Defense authorities with planning ways and means of feeding people. Separate sections of the booklet are devoted to the ways in which home economists in various specialized fields —including teachers of food and nutrition and dietitians—can plan for and help in Civil Defense. This booklet might serve as a pattern for other local or state groups which are active in Civil Defense planning and work. Requests for copies should be directed to the author.

AMSC News. On November 3, Col. Ruth A. Robinson was sworn in as the fourth Chief of the Army Medical Specialist Corps. For the past three years, Col. Robinson has been Chief Occupational Therapist at Walter Reed Army Hospital, Washington, D. C. She succeeds Lt. Col. Harriet S. Lee, who has been assigned to the Army Medical Service Historical Unit at Walter Reed Army Medical Center.

The following personnel announcements concerning AMSC dietitians have been made:

Capt. Mary A. Neacy has received a Regular Army appointment, while Erma G. Lord has been relieved from active duty in the Regular Army.

The following promotions from Major to Lt. Colonel have been made:

Elizabeth S. Carloss
Alene V. Ness

APPOINTMENTS AND ACTIVE DUTY

1st Lieutenant

Peggy Ann McCullin

2nd Lieutenants

Norma J. Bodie
Joan L. Budzisch
Florence A. Burgly
Christine S. Cardwell
Vivian S. Connelly
Priscilla DeJesus-Carrasquillo
Joan Forester
Marie M. French
Mary A. Helm
Colleen P. Lapcevic
Dorothy M. Mount
Caroline W. Nizborski
Marie J. O'Brien
Regina M. Onda
Iris A. Quintana-Medina
Bonnie M. Rehder
Marilyn Y. Scott
Marian V. Strzelec
Sarah K. Swift
Patricia F. Tripp
Barbara Ullrich
Ruth V. Vest
Jane L. Welches

RESERVE OFFICERS RELIEVED FROM ACTIVE DUTY

Doris J. Durey
Barbara B. Kinman
Geraldine B. Linenberg
Beverly I. Lutz
Gloria S. Silva
Mary C. Sullivan
Priscilla A. Trayers
Virginia H. Woodside

Maj. Dorothy E. Jones, Chief, Ward Food Service Branch, Walter Reed Army Medical Center, has been awarded the Walter Reed Certificate of Achievement for outstanding performance on duty at the hospital in the past three years.

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Low Sodium Milk fortifies the nutritional value of any diet for it contains many of the proteins, vitamins and minerals so essential for good health and growth.
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An AMSC-sponsored **Student Dietitian Program** giving financial assistance to outstanding students majoring in Foods and Nutrition or Institution Management. You enlist in the Women's Army Corps Reserve, and remain in your school to complete your educational requirements, receiving in excess of $200 per month. At the time of graduation you are commissioned in the AMSC to take part in Dietetic Internship.

An AMSC-sponsored **Dietetic Internship,** enabling you to qualify as a hospital dietitian without financial worry. Approved by the American Dietetic Association, this 12-month internship gives you experience in both the administrative and therapeutic phases of dietetics. The internship is conducted at Walter Reed Army Hospital, Washington, D. C., and Brooke Army Hospital, San Antonio, Texas. Upon entering the program you will be commissioned a Second Lieutenant in the AMSC, Army Reserve, will receive $270.18 per month, with your quarters furnished to you, and will enjoy the rank and prestige of an Army officer. After completing your internship, you will be assigned as a staff member in an Army hospital, working with other officers in an outstanding professional career.

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However, from the manufacturers' viewpoint, the treated chocolate is thick and gummy in consistency when melted and its viscosity makes it impossible with commercial machinery to apply in sufficiently thin coating to chocolate-covered candies. Research is being continued to adapt the findings to commercial use.

Tenderness in Poultry. The USDA's Western Utilization Division in Albany, California, reports that aging poultry at least 12 hr. before freezing improved tenderness, and that birds aged before being cut up were more tender than those aged afterward. Severe scalding—above 125°F.—and mechanical picking both interfere with normal tenderizing.

Frozen Guacamole Improved. By combining waxy-rice flour and sodium alginate with guacamole before freezing, the water separation experienced in the past is reduced. Although separation of water from the solids of the avocado flesh when thawed does not affect quality or flavor, it makes the guacamole appear unappetizing. Adding waxy-rice flour alone altered the taste of the guacamole, but the substitution of sodium alginate for part of the waxy-rice flour overcame this. The research work was done at the USDA's Fruit and Vegetable Laboratory, Weslaco, Texas.

News of State Associations

Arizona Dietetic Association. November 14 and 15 were the dates of the fall meeting of the Arizona Dietetic Association in Phoenix. The program included:

"New Methods in Food Processing"—Capt. Jack Dean, SC, USN, Director, Research and Development Division, Bureau of Supplies and Accounts, U.S. Navy Subsistence Office, Washington, D. C.

"Civil Defense Workshop on Survival and Radiological Defense"—Ray Martinez, Arizona Director of Civil Defense

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"Detection and Decontamination of Food and Water Supplies"—Mason A. Lang, Supervisor of Food Sanitation, Arizona Department of Health

"Community Nutrition Among Our Indian Neighbors"—Kathleen Van-Cleft, Nutritionist, Division of Indian Health, U.S. Public Health Service, Phoenix

"Mass Screening for Determination of Diabetes"—Vincent V. Larson, Director, Venereal Disease Division, Arizona Department of Health, Phoenix

"There Ought to Be a Law"—Mason A. Lang

"Tested Management Techniques"—Standard Brands film

In 1958, the Arizona Dietetic Association was the recipient of a DuBois Foundation Dietetic Internship Scholarship. The award of $200 went to Marcia Froze, University of Arizona, who is now an intern at Alameda County Hospital, Oakland, California.

California Dietetic Association. "Food Comes First" was the theme of an educational feature of the 1958 California State Fair at Sacramento, which included several displays and demonstrations. The theme carried out the objective adopted last spring by the California Food Conference. One of the sponsoring organizations of the State Fair exhibit was the *Bay Area Region* of the California Dietetic Association. The exhibit hall, which was near the main entrance to the Fair, featured four main groups of food: milk, meat, vegetables and fruits, and bread and cereals. Each group was assigned a color which was repeated in printed leaflets that were distributed to visitors. The design of the leaflets was adopted from the USDA's leaflet, "Food for Fitness." Displays were manned by nutritionists of the several participating organizations and representatives of food industry councils. A Sacramento newspaper published a photographic "tour" of the show. The exhibits were grouped so that a center of interest was a small theater with benches, a stage, and a preparation area behind the stage. Here a series of food preparation demonstrations was given by the nutritionists, as well as skits to dramatize the requirements of a good diet for family members of various age levels. The scripts were written by committees of the participating groups, including dietitians of the Bay Area Region.

So successful was the Fair "Food Comes First" exhibit that the theme was adopted for a community exhibit in Berkeley on October 20, which was sponsored by a number of local groups, including the public schools, the health department, the University of California School of Public Health, and the Agricultural Extension Service. The skits presented in Sacramento were repeated, and a discussion panel was a special feature which included representatives of the medical, dental, dietetic, and home economics professions. The leaflet used in Sacramento was reprinted and distributed. The two events reached thousands of people and demonstrated the value of cooperative effort by all organizations concerned with nutrition education.

Connecticut Dietetic Association. On November 13 in Hamden, the Connecticut Dietetic Association celebrated its twenty-fifth anniversary. The program featured: an address, "Lights under Bushels" by George Anderson, Dudley-Anderson-Yutzy, New York; and a panel on "Listening with Both Ears" by three representatives from the Southern New England Telephone Company. The film, "Production 5118," on communication was shown.

Indiana Dietetic Association. Bloomington was the scene of the fall meeting of the Indiana Dietetic Association on November 12. The featured speaker was Dr. Eunice C. Roberts, Assistant of the Faculties and Director, Women's Education Programs, Indiana University, whose subject was "Maids, Wives, Widows."

On September 10, at Purdue University, Lafayette, the Indiana Dietetic Association held its first Continuing Education Conference. Fifty-two members, students, and guests attended. Dr. E. R. Ryden, Director,

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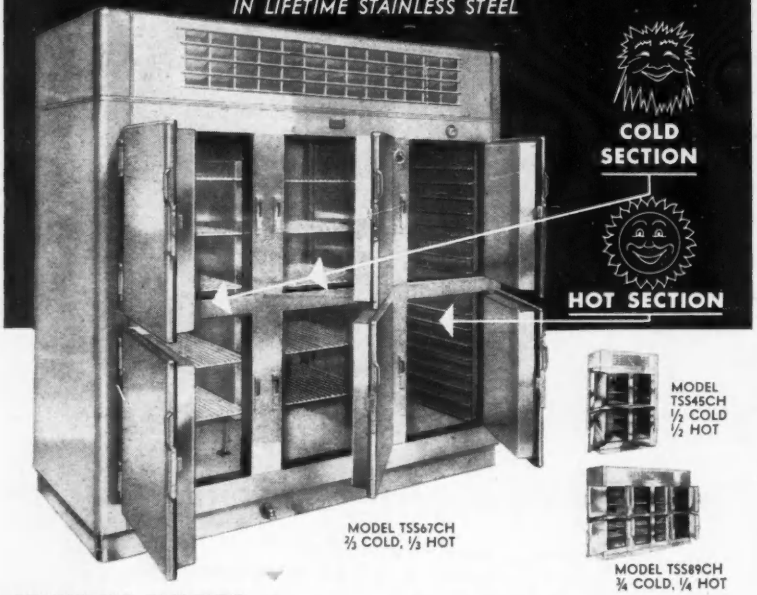

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State Training Program for the Agricultural Extension Service, Purdue University, spoke on "Basic Communications" and "Two-Way Communication Problem Solving."

Iowa Dietetic Association. The Iowa Dietetic Association met on November 13 in Des Moines. The program featured:

"Increasing the Value of Employees" —Edward Arntz, Personnel Supervisor, Northwestern Bell Telephone Company, Des Moines

"Radiation Preservation of Foods"—Quartermaster Research Engineering Command, U.S. Army

The A.D.A. film, "View from the Mountain," was shown.

Kansas Dietetic Association. On November 14 and 15, the Kansas Dietetic Association met at Kansas State College, Manhattan. The program included a session on recruitment which featured the new A.D.A. film, "View from the Mountain," as well as a panel discussion, entitled "The Dietetics Profession as Seen Through the Eyes of Our Students and Our New Dietitians." Another session was developed as "A Challenge to the Membership," with group discussion on "fringe" members, section activities, and professional attitudes. A report on the Food Service Personnel Training Program was made by Bessie B. West, Professor of Institutional Management, Kansas State College.

The second day's program included:

"Food with a Flair"—Elizabeth McCorkle, Manager of Food Services, Scruggs, Vandervoort and Barney Stores, St. Louis

"What's New in Research?" — Dr. Dorothy Harrison, Head, Department of Foods and Nutrition, Kansas Agricultural Experiment Station, Kansas State College, Manhattan

Louisiana Dietetic Association. On November 7 and 8, the annual meeting of the Louisiana Dietetic Association was held in Alexandria. The program included:

"Listening and Communication"—Dr. Edward J. Kramer, Assistant Professor of Speech, Southwestern Louisiana Institute, Lafayette

"Planning a Disaster Feeding Program"—Maj. Katherine Manchester, Chief, Food Service Division, Brooke Army Hospital, Ft. Sam Houston, Texas

"Quality Food Production" — Margaret Mitchell, Vice-President, Food Production, Stouffer Restaurants, Cleveland

"Dietary Fats in Relation to Atherosclerosis"—Dr. Russell L. Holman, Head, Pathology Department, Louisiana State University School of Medicine, New Orleans.

Dr. Bruce Kirk, A.D.A. Continuing Education Services Director, represented the national Association at this meeting.

The following took office for the year 1958-59: President, Dorothy Bachemin, Southeastern Louisiana College, Hammond; President-Elect, Shirley Smith, Lafayette; Treasurer, Mary Jane Gelpi, U.S. Public Health Service Hospital, New Orleans; and Secretary, Emily Bullock, Greenwell Springs.

Maryland Dietetic Association. In December, the Maryland Dietetic Association co-sponsored, with the Maryland State Conference of Social Welfare, a luncheon, the purpose of which was to study the adequacy of the present allowance for food for persons receiving state help. A menu costing 20 cents was served. Members of the Maryland General Assembly and other public officials were invited.

The first meeting of the training course organized by the Food Administration Section for food service supervisors and being given in connection with the Baltimore Public Schools' Department of Adult Education was held on November 19. Twenty-one students attended.

Michigan Dietetic Association. A paper on "Space Nutrition" by Jane C. Ebbs, Special Feeding and Nutrition Advisor, Office of The Quartermaster General, Department of the Army, Washington, D. C., was a feature of the fall meeting of the Michigan Dietetic Association on November 4 in Kalamazoo. Other speakers were: C. B. Knapp, Vice-President and General Manager, Bill Knapp's Restaurants; and Lydia Siedschlag, Art Consultant, Western Michigan University, Kalamazoo. Reports of the A.D.A. meeting in Philadelphia were made by the Michigan delegates.

New Jersey Dietetic Association. On November 20 and 21, the New Jersey Dietetic Association met in Newark. The program included:

"Nutrition in Relation to World Food" —Jean McNaughton, Regional Advisor on Nutrition, Food and Agriculture Organization, Washington, D. C.

"Food as Affected by Religious Beliefs"—Rabbi A. Soltes and Rev. D. J. Nobel

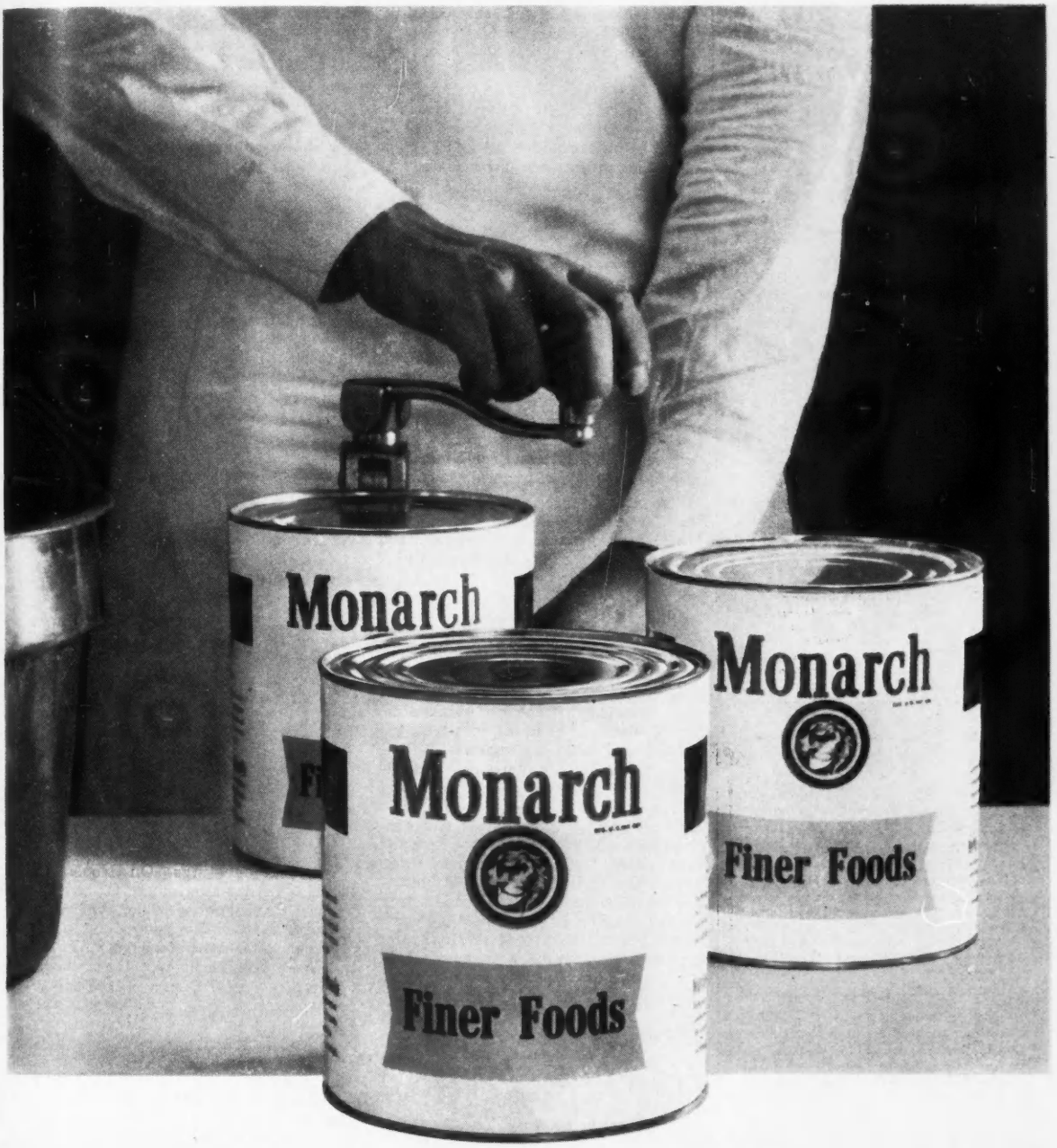
"Food Habits of Teenagers in New Jersey"—Dr. Edna Sostman, Assistant Professor of Home Economics, Rutgers University, New Brunswick

"Is Your Public Relations Program as Hot as Your Coffee?"—Catherine R. Ready, Assistant Director of Education Service, Bristol-Myers Products Division

"Seeing Ourselves as Others See Us" —a panel discussion

"New Ideas in Kitchen Planning and Equipment"—Owen Webber, Food Equipment Consultant, New York City

Elizabeth Caso represented the na-



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Most simple, natural, efficient system of all!

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The easiest to learn and most natural to operate. Requires no skilled personnel . . . frees nurses for full-time nursing duties. Gives dietitian complete control over makeup of trays — assures the specified menu for every patient. Serves food hot, palatable . . . and FAST! Mercury Control results in less waste and tremendous saving in food requirements.

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Only with MERCURY can you provide the "Continental Touch" of individual plate covers — that surprise factor that makes the meal more appreciated. Plate covers prevent the transfer of food flavors between plates . . . keep food piping hot right up to the bedside. MERCURY plate covers are designed specifically for hospital use . . . write for literature.

- Simple to load — meals dished up complete and checked for accuracy before leaving kitchen.
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Ask about a free demonstration in your own hospital . . . with no obligation to buy. WRITE FOR LITERATURE AND COMPLETE INFORMATION.

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tional Association at this meeting. The A.D.A. film, "View from the Mountain," was shown at the business meeting.

Virginia Dietetic Association. The Virginia Dietetic Association met in Roanoke on November 14 and 15. The following program was presented:

"Dab Management"—Cloyd S. Steinmetz, Director of Sales Training, Reynolds Metals Company, Richmond

"Protein Nutrition and the Liver"—Dr. Paul Gÿorgy, Professor of Pediatrics, University of Pennsylvania School of Medicine, Philadelphia

"Emotional Aspects of Diet and Nutrition"—Dr. Frank Merker, Director of Professional Services, VA Hospital, Roanoke

"Food Management Problem Clinic"—a "conference" discussion

"Present Concepts in Teaching Student Nurses"—a panel discussion

The A.D.A. career film, "View from the Mountain," and the American Medical Association's film on food misinformation, "The Medicine Man," were shown.

Ohio Dietetic Association. On October 8, the Columbus Dietetic Association held a dinner in honor of LeVelle Wood, then President-Elect of A.D.A. More than one hundred guests were greeted by the receiving line. The Columbus Association presented Miss Wood with an engraved silver tray. Other local dietetic associations in the state also sent gifts: from Dayton, a Paul Revere silver bowl, and from Cleveland, a basket of chrysanthemums. Miss Wood also received roses from the Ohio Fuel Gas Company. Dr. John T. Mount, Administrative Assistant to The Ohio State University spoke of Miss Wood's many professional contributions and her achievements as a person.

Association Activities

42nd Annual Meeting. The 42nd Annual Meeting of our Association will be held in Los Angeles, August 25 to 28, 1959, Plan now to attend.

41st Meeting. There was a record attendance of 4621 at the 41st A.D.A. Annual Meeting in Philadelphia. This was 635 more than our largest previous registration recorded in Milwaukee in 1956. The exhibition was also the largest in our history, with 272 booths representing 192 exhibitors.

View from the Mountain. Prints of the new A.D.A. career guidance film, "View from the Mountain," should be purchased immediately so that scheduling for school and college showings may be made. Plans for assemblies and career days are made far in advance of their actual dates.

The cost of the print is $125. Television clearance has been obtained, and you are free to arrange for such showings on public service time. The running time is 22 min. 42 seconds. As of November 24, twenty-four prints had been purchased by state dietetic associations. Fifty loan prints have been distributed to the twenty-eight regional offices of Modern Talking Picture Service. By December 1, approximately 400 assignments had already been made for winter and early spring months.

Representatives Attend State Meetings. A.D.A. representatives attended the following state dietetic association meetings this fall:

October 31–November 1 — Dorothy Bovee, *South Dakota*, Pierre

November 6–8—R. Bruce Kirk, Ph.D., *Louisiana*, Alexandria

November 7—Margaret L. Ross, Ph.D., *West Virginia*, Huntington

November 7–8—LeVelle Wood, *South Carolina*, Greenville

November 14–15—Helen H. Anderson, *Oregon*, Portland

November 21—Elizabeth K. Caso, *New Jersey*, Newark

November 21–22—Beulah Hunzicker, *Mississippi*, Jackson

A.D.A. Membership. As of September 30, 1958, A.D.A. membership was 13,287. This includes 633 life members, 7 honorary members, 121 associate members, and 24 retired members. Total membership as of October 28, 1958, was 13,575.

National Meetings. On November 26, 1958 in Washington, D. C., LeVelle Wood, President of The American Dietetic Association, represented us at a special meeting called by Arthur S. Flemming, Secretary, *Department of Health, Education, and Welfare*, for the purposes of discussing the following general areas: (a) emerging health trends and problems; (b) emerging community health problems and needs to which the Department of Health, Education, and Welfare should be alerted, and (c) means for continuing the close relationships between the Department and organizations such as A.D.A.

The *Food and Drug Administration* held a meeting December 18, 1958 in Washington, D. C., to discuss the technologic and scientific changes in the food, drug, and cosmetic industries. The recently enacted amendments pertaining to pesticide chemicals and food additives, as well as the subject of nutritional and medical quackery, were included on the agenda. Helen R. Cahill represented the Association at this meeting.

Merme Bonnell represented A.D.A. at a meeting of *The Food Law Institute*, November 24 and 25, in Washington, D. C., concerned with legislation in this field.

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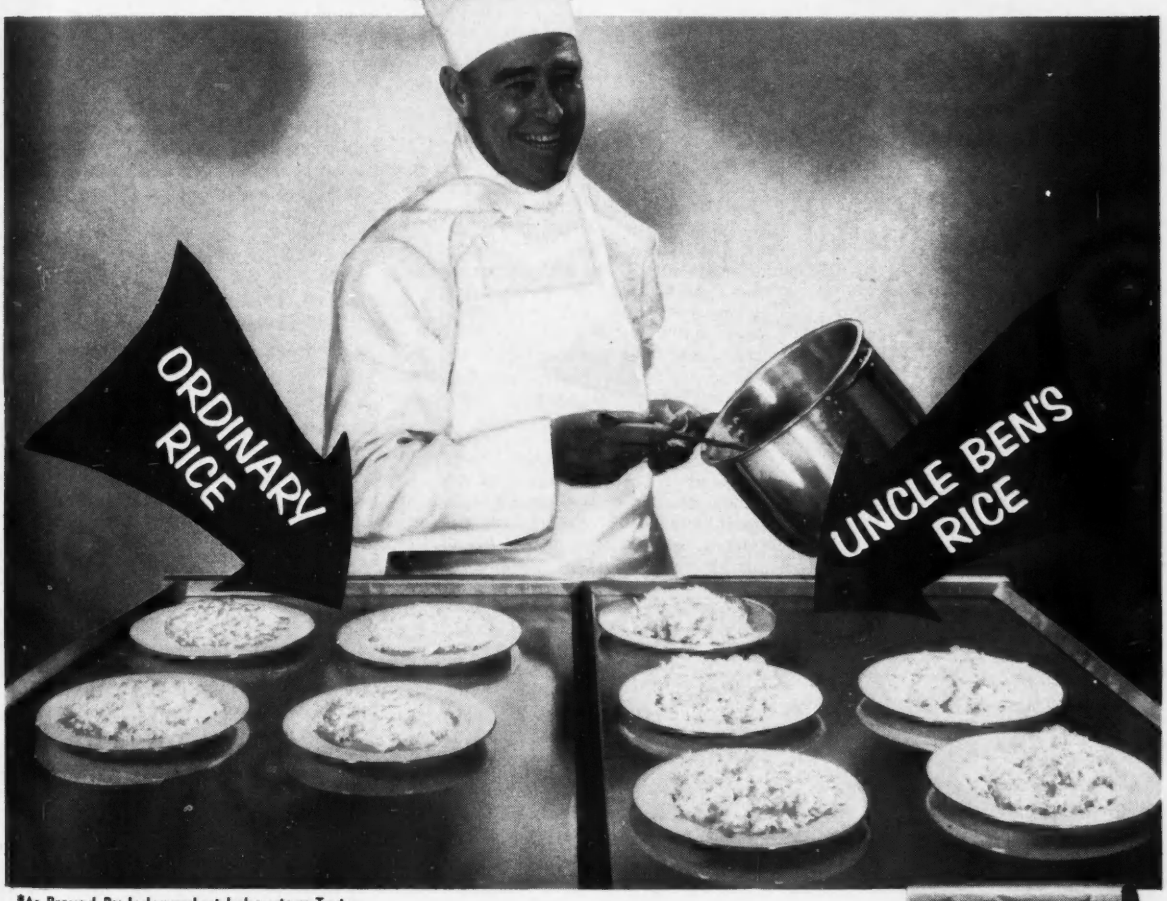

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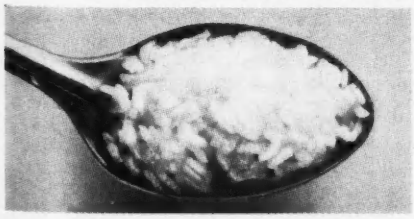
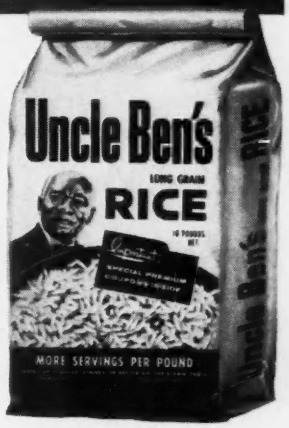


ORDINARY RICE gives fewer servings per pound because it tends to cook up denser and less fluffy, with grains sticking together.

UNCLE BEN'S RICE is different! Because Uncle Ben's exclusive process makes it cook up light and fluffy, each grain separate. That's why it goes further—gives up to 23% more servings per pound. Uncle Ben's Rice stays fluffy hours on steam table . . . reheats beautifully after refrigeration. More food value, too! Helps grow healthier bodies—because it contains *twice* the natural B vitamins of ordinary rice.



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On October 30, Mary Reeves represented the Association at a meeting on "Man Power Shortages in the Field of Health," sponsored by the *National Health Council* held during the American Public Health Association meeting in St. Louis. Reference was made to the Federal traineeship program for nurses and for all public health workers, as well as other scholarship funds available. The major need today is to interest junior high and high school students in health careers and then provide the guidance necessary to direct them to the career to which they are best suited. It was suggested that since medical auxiliaries are extremely active in recruitment, these are appropriate groups to contact. Opportunities for the physically handicapped in health careers is another area that is frequently overlooked in recruitment. The Future Nurse Clubs are currently being converted to co-educational Future Health Clubs, and this change in organization has proved most popular. Miss Reeves indicated that throughout the session, references were made to the shortage of dietitians and nutritionists, and credit was given to the Association's activities in recruitment and guidance programs.

Mary McInerney was alternate representative for Marguerite J. Queneau at a meeting of the Policy Committee of the *National Citizens Committee for World Health Organization* held October 29 in St. Louis during the American Public Health Association meeting.

Margaret C. Madden represented the Association at the annual meeting of the *American School Food Service Association* in Philadelphia, held November 16 to 20.

Zelda T. Covey served as A.D.A. representative at the inauguration of Howard Mitchell Phillips as President of *Alabama College* on October 14 in Montevallo.

Obituary

Frances Claywell Seed. The A.D.A. office has been notified of the death on September 1 of Frances Clavwell Seed in Toledo. Mrs. Seed had been a member of the Association since June 1958. She had been employed on the staffs of Flower Hospital and the Opportunity Home for Children, Toledo. From 1947 to 1949, she served as Chief Dietitian, Musgrave Park Hospital, Belfast, Ireland.

News of Products and Services

A new bulk food service conveyor providing service for sixty-five persons has been introduced by the *Colson Corporation.* For use in institutions where trays are prepared at floor pantries, the conveyor is designed to keep food hot from kitchen to the set-up area. Four 8½-qt. and three 4-qt. round food wells, and a 16-qt. meat pan are inset and integrated with the top deck for an easily cleanable, crevice-free surface. The meat tray cover has a recessed top which may be used as a serving shelf when open. A stainless steel utility drawer, located below the meat pan, fits into a heated drawer pocket. The lower section of the conveyor is fitted with double storage compartments equipped with refrigerator-type shelves. A heater for this section is available as optional equipment. Controls are automatic. Another model provides service for eighty-five persons.

During January and February the Institutional Products Department of *General Mills, Inc.*, will offer five-piece place settings of stainless tableware in the "Twin Star" pattern with purchases of its institutional cake mixes and "Cobbler Cake."

Campbell Soup Company, under its Swanson brand, has two new products, "Chunks O' Chicken" and "Chunks O' Turkey," available in 30-oz. institutional size. Light and dark meat are packed in natural juices without the addition of broth and may be used in sandwiches, salads, casseroles, and creamed dishes.

A new instant, nonfat chocolate milk in powder form has been introduced by the *Michigan Milk Producers Association.* Only butterfat and water have been removed, producing a low-calorie product, suitable for use wherever skim milk is recommended. Large powder particles to which water is added dissolve instantly producing a smooth texture with stabilized chocolate solids that do not settle out. It may be used for a hot or cold drink, requires no refrigeration, and will not spoil at room temperatures. It will be packaged in 5-, 25-, and 50-lb. polyethylene-lined bags for the institutional trade.

Since many canned foods are used in recipes, the sizes of cans and jars are important in buying and using these foods. The Consumer Service Division of the *National Canners Association* has prepared a leaflet, "Of Recipes and Can Sizes," supplying this information.

A fat filter, F-60 Fry-Saver, for food establishments that use only one fryer, is being offered by *S. Blickman, Inc.* The Fry-Saver is automatic, works just like a vacuum cleaner. Roll the caster-mounted unit to the fryer, plug it into any standard a.c. outlet, insert the hose in the oil, and flick the switch. The Fry-Saver pulls all the oil out of the fryer, filters it, then pumps pure oil back. Filtering may be done at room temperature. The operator can remove the used fat, flush the fryer, and return the clean fat to the fryer within 5 min. The new unit holds 60 lb. (8 gal.) of fat. A height of 23½ in. makes storage in a small space possible.

Advances in Nutrition[1]

CHARLES GLEN KING, Ph.D., D.Sc.,
Executive Director,
The Nutrition Foundation, Inc.,
New York, New York

EXCEPT FOR very short periods, advances in basic research are essentially universal in their application. For example, the advances leading to a better understanding of fat requirements and fat metabolism in this country, where excess body fat appears to be our worst form of malnutrition, give information of almost equal value in other parts of the world where nutrient deficiencies still constitute their major problem. Similarly, the immediate task of improving the intake of protein foods in areas where protein malnutrition is severe can use to great advantage the information from here, or elsewhere, on amino acid requirements. In like fashion, the work in Guatemala or Bombay has immediate value here, both in terms of health and in economic progress, even though the details of our problems are very different.

Lipid Metabolism

An important advance in clarifying the manner in which living cells synthesize and use lipid materials as a source of energy was reported by Lehninger and his associates at Johns Hopkins University during the year (1). The pathways by which four successive oxidation steps can bridge the gaps between oxygen from the air and the fatty acid or sugar fragment to be burned were outlined in terms of specific enzyme systems. Adenosine triphosphate is a key agent at each of the four major reaction cycles. Many details remain to be established, of course, but the recent progress in this area of research is really remarkable.

Everyone is interested in the basic problem of understanding the composition and normal use of fats, but there is unprecedented interest currently in the great number of public health problems which are interwoven with distortions from the normal use of fatty materials in the diet (2).

An interesting and new starting point from which to view the digestion and utilization of fats has been furnished by the evidence that most of the common edible fats are characterized by a high degree of structural specificity (3). The plant fats are much more regular in this respect than the animal fats. The dominant glyceride structure in plant fats is characterized by the position of oleic acid in being esterified on the glycerol beta or 2 position. Whatever saturated fatty acids are present are esterified at the 1 and 3 positions. Linoleic acid also tends to occupy the beta position in preference to the 1 or 3 positions.

In animal fats, there is less uniformity in structural pattern, but each species of animal fat tends to have its own regular structure pattern. Pig fat, for example, was found to be unique among all the fats studied so far, in that saturated fatty acids are chiefly in the 2 position instead of the 1 and 3 positions. In contrast, beef, mutton, and human fat resemble plant fats in having the saturated acids in the 1 and 3 positions. Molecular studies of this kind have a basic relationship to the digestion of fats since evidence has been presented that the pancreatic enzyme also shows a characteristic structural specificity by removing the fatty acids from the 1 and 3 positions almost entirely before the fatty acids in the 2 position are removed.

The progress made in analyzing fats within the past two years is really fantastic. Only a few years ago, 100-gm. or even kilogram quantities were needed as a starting sample, and even then the analyses were generally far from complete or accurate. By using the new gas chromatography apparatus, accurate separations and measurement of fatty acids can now be made on samples less than 1 mg. in weight (4, 5).

Contrasts in the nutritional response of different fatty acids have come to light, also, with remarkable suddenness. For example, oleic and linoleic acids show variations in nutritive value, depending in part on a number of other dietary constituents and whether they are furnished as free acids, as simple esters of ethyl alcohol, or as esters of glycerol.

Among the detailed studies of fatty acid requirements in experimental animals, Aaes-Jorgensen and Holman have furnished evidence of the importance of fatty acid intake on the lipid content of the heart

[1]Presented at the 41st Annual Meeting of The American Dietetic Association in Philadelphia, on October 22, 1958.

tissue (6). Rats subjected to a deficiency of essential fatty acids showed a marked drop in the heart content of linoleic acid and tetraenoic acids. In contrast, there was a marked rise in the storage of a trienoic fatty acid which was isomeric with linolenic acid. The newly stored abnormal fatty acid is thought to be derived from oleic acid instead of from one of the essential fatty acids. The evidence of a gross abnormality in the fat content of the heart shows a trend of biochemical study that is almost certain to be highly significant.

Steinberg *et al.* (7) have developed additional evidence that linolenic acid is rapidly and extensively oxidized to carbon dioxide in rats, in parallel with its serving as a source of carbon chain fragments to build new polyunsaturated fatty acids containing twenty or twenty-two carbon atoms. In doing so, however, the linolenic acid does not give rise to either linoleic or arachidonic acid as intermediates. Since these two acids are adequate and essential for cellular functions, the limitation in using linolenic acid furnishes a basis for excluding it from the list of "essential" fatty acids (8).

There is general agreement that the C^{20} acid, arachidonic acid, is an essential constituent of body cells for their normal functioning and that this acid, which occurs only in small amounts in common food supplies, can be formed readily from linoleic acid, if there is an adequate intake of vitamin B_6 and other essential nutrients.

$CH_3\text{-}(CH_2)_7\text{-}CH{=}CH\text{-}(CH_2)_7\text{-}COOH$
oleic acid

$CH_3\text{-}(CH_2)_4\text{-}CH{=}CH\text{-}CH_2\text{-}CH{=}CH\text{-}(CH_2)_7\text{-}COOH$
linoleic acid

$CH_3\text{-}CH_2\text{-}CH{=}CH\text{-}CH_2\text{-}CH{=}CH\text{-}CH_2\text{-}CH{=}CH(CH_2)_7\text{-}COOH$
linolenic acid

$CH_3(CH_2)_4\text{-}CH{=}CH\text{-}CH_2\text{-}CH{=}CH\text{-}CH_2\text{-}CH{=}CH\text{-}CH_2\text{-}CH{=}CH\text{-}(CH_2)_3\text{-}COOH$
arachidonic acid

There has been much discussion of the possible limitation in the animal and human capacity to utilize the trans- or high-melting types of unsaturated fatty acids, but there is still reason to question whether this problem is of serious importance. Elaidic acid, the trans-isomer of oleic acid, and moderate amounts of other trans-isomers of the common fatty acids have been utilized readily as energy sources in most of the reported quantitative studies. The long-term feeding experiments of Alfin-Slater and others also continue to indicate that the trans-fatty acids in edible fats can be utilized readily, if the intake of other fatty acids and required nutrients is reasonably well balanced (2). In this case, one should emphasize that avoiding an excess of caloric intake is an important aspect of a well balanced diet.

A relatively new and in some respects a minor aspect of fat metabolism is, nevertheless, of intense current interest, namely, the effect that diet may have on the deposition of gallstones. H. Dam *et al* (9), in studying this problem, have obtained clear evidence that dietary factors in hamsters and other experimental animals can play a completely dominant role in causing or preventing gallstones under experimental conditions. Bevans and Mosbach (10) have made closely related observations in studies of rats, rabbits, and other experimental animals. For example, feeding 0.25 per cent of dihydrocholesterol to rabbits induced gallstones within one week's time, and within a few weeks, massive deposition of gallstones was evident in 100 per cent of the test groups, with none in the control or stock diet group. Of further interest was the fact that the gallstones contained practically no cholesterol or dihydrocholesterol but instead consisted almost entirely of bile salts (9-11).

EPIDEMIOLOGIC STUDIES

Progress reports have been released from several of the large scale testing programs dealing with the nutritional and epidemiologic aspects of heart disease and atherosclerosis. The Framingham, Massachusetts, study is perhaps the most widely known of these investigations. The progress reports have clearly demonstrated the value of such large scale epidemiologic studies (12).

Thus far, each of the different area studies has shown distinct variations in the quantitative range of the relationships between disease and the recorded factors that have a bearing on the incidence of breaks in health. However, there has been reasonably good agreement that the genetic factor or familial trend is important; second, that a sustained high blood cholesterol concentration increases the risk of diseases related to atherosclerosis; and third, that the risk is further increased when there is a sustained high blood pressure or overweight. Most of the studies have also found a positive correlation with cigarette smoking. Thus far, however, there has not been sufficient correlation for any one factor to permit a satisfactory prognosis for individuals nor a firm basis for preventive measures, dietary or otherwise. Nevertheless, the record is increasingly impressive that many factors are at play and that the risks of breaks in health are markedly additive. When two or three trends are unfavorable (such as overweight and hypercholesteremia), the prognosis for an individual becomes increasingly significant.

AREAS NEEDING RESEARCH

Among the dietary relationships that have been suggested by experimental data but for which there is still not sufficient quantitative evidence in human studies are the following:

The intake and quality of protein
The percentage of caloric intake as fat

The ratio among different fatty acids
The intake of vitamin B_6
The relative balance in the intake of minerals with special attention to calcium, magnesium, sodium, and potassium
The intake of what might be considered incidental lipid materials, such as plant and animal sterols
Lipids that give rise to increased formation of sterols and hormones, e.g., mevalonic acid or squalene
The effect of intestinal flora on lipid metabolism
Physical work and recreation

For example, the effects of dihydrocholesterol and the disturbances in bile acid metabolism obviously may have an important bearing on fat utilization and cholesterol excretion, but information in this area relative to public health is almost completely lacking.

In the studies by Mosbach, for example, the massive disturbances in bile acid metabolism induced by feeding dihydrocholesterol were accompanied by a lowering of the serum cholesterol. A change of that nature might be interpreted wrongly as favorable.

Another area of fat metabolism that appears to offer considerable promise is with respect to the labile non-esterified fatty acids in the blood stream and body tissues. Bierman *et al.* have pointed out the importance of this group of fatty acids in poorly controlled diabetes (13).

Proteins and Amino Acids

Pond *et al.* have reported on the amino acid adequacy of sorghum grain as a food that appears to offer a major source of protein as well as starch and other nutrients in the human food supply in addition to its expanding position among animal feed grains (14, 15). The rat tests with sorghum grain gave higher biologic values than one might expect in terms of the marginal content of several amino acids. Although the methionine and isoleucine values are marginal on a chemical basis, the results when fed indicated a favorable contribution of tryptophan, methionine, and isoleucine. An addition of 0.5 per cent lysine and 0.2 per cent threonine permitted growth in weanling rats equivalent to a diet containing 11 per cent casein. There was no further gain by the addition of methionine, isoleucine, tryptophan, or valine.

Hundley *et al.* have given valuable information on the protein value of rice in tests with young human adults, when served with a mixed diet in which rice was the chief source of protein. However, there was a considerable intake of fruit. Although there was evidence of a further advantage when threonine and lysine were given to the subjects, the effect was surprisingly slight (16). The response in one of the four subjects was distinctly negative, and the average effect for the entire group was not appreciably better than when an equivalent amount of non-essential amino acids was fed as a source of nitrogen. These results like many others demonstrate the need for caution in estimating the nutritive value of amino acid supplements based on analytical data alone. Fruits, for example, although low in total protein content are often omitted in considering amino acid intake, when, as a matter of fact, they can furnish significant quantities of essential amino acids to supplement a diet in which a single food, such as rice, corn, or wheat, serves as the main source of protein and calories (17-19).

Although extravagant claims for improvement in the growth of infants and in the health of adults are often reported on the basis of amino acid supplements (especially lysine), many of the recent highly publicized reports did not furnish acceptable evidence in support of the claims. There is a tendency to over-emphasize short-term tests with human subjects when a small amount of evidence appears to have favorable significance for a specific product, whereas more comprehensive studies might give a different result. Positive findings in such instances tend to become valuable for advertising purposes, while negative findings are often left unpublished and thus tend to be omitted from promotional literature or scripts intended for sales promotion. However, supplementation of specific cereal products under controlled conditions of feeding often gives clear evidence of the gains that can result from amino acid supplementation, as one would expect when there is a true first-limiting deficiency of a specific amino acid.

Vitamins

The long debated question of whether human tissues are subject to a definite requirement for pre-formed inositol, in the sense of a vitamin relationship, received substantial clarification during the past year. Eagle *et al.* have demonstrated (20) a requirement specifically for myo-inositol in eighteen different human tissue strains, and with living cell cultures obtained from several different body structures. In all cases, there was a clear-cut requirement for inositol to sustain survival, growth, or protein synthesis. The difficulty in demonstrating a human requirement in straight-forward feeding tests apparently has resulted from an appreciable degree of synthesis in the intestinal tract by the microflora characteristically present.

A new approach to appraising the importance of vitamin B_6 in human nutrition was furnished by Bessey *et al.* in relation to the convulsion phenomenon which caused considerable excitement a few years ago as a result of B_6 deficiencies identified as a result of over-processing infant foods (promptly corrected). Although there appears to be little risk

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On October 30, Mary Reeves represented the Association at a meeting on "Man Power Shortages in the Field of Health," sponsored by the *National Health Council* held during the American Public Health Association meeting in St. Louis. Reference was made to the Federal traineeship program for nurses and for all public health workers, as well as other scholarship funds available. The major need today is to interest junior high and high school students in health careers and then provide the guidance necessary to direct them to the career to which they are best suited. It was suggested that since medical auxiliaries are extremely active in recruitment, these are appropriate groups to contact. Opportunities for the physically handicapped in health careers is another area that is frequently overlooked in recruitment. The Future Nurse Clubs are currently being converted to co-educational Future Health Clubs, and this change in organization has proved most popular. Miss Reeves indicated that throughout the session, references were made to the shortage of dietitians and nutritionists, and credit was given to the Association's activities in recruitment and guidance programs.

Mary McInerney was alternate representative for Marguerite J. Queneau at a meeting of the Policy Committee of the *National Citizens Committee for World Health Organization* held October 29 in St. Louis during the American Public Health Association meeting.

Margaret C. Madden represented the Association at the annual meeting of the *American School Food Service Association* in Philadelphia, held November 16 to 20.

Zelda T. Covey served as A.D.A. representative at the inauguration of Howard Mitchell Phillips as President of *Alabama College* on October 14 in Montevallo.

Obituary

Frances Claywell Seed. The A.D.A. office has been notified of the death on September 1 of Frances Clavwell Seed in Toledo. Mrs. Seed had been a member of the Association since June 1958. She had been employed on the staffs of Flower Hospital and the Opportunity Home for Children, Toledo. From 1947 to 1949, she served as Chief Dietitian, Musgrave Park Hospital, Belfast, Ireland.

News of Products and Services

A new bulk food service conveyor providing service for sixty-five persons has been introduced by the *Colson Corporation*. For use in institutions where trays are prepared at floor pantries, the conveyor is designed to keep food hot from kitchen to the set-up area. Four 8½-qt. and three 4-qt. round food wells, and a 16-qt. meat pan are inset and integrated with the top deck for an easily cleanable, crevice-free surface. The meat tray cover has a recessed top which may be used as a serving shelf when open. A stainless steel utility drawer, located below the meat pan, fits into a heated drawer pocket. The lower section of the conveyor is fitted with double storage compartments equipped with refrigerator-type shelves. A heater for this section is available as optional equipment. Controls are automatic. Another model provides service for eighty-five persons.

During January and February the Institutional Products Department of *General Mills, Inc.*, will offer five-piece place settings of stainless tableware in the "Twin Star" pattern with purchases of its institutional cake mixes and "Cobbler Cake."

Campbell Soup Company, under its Swanson brand, has two new products, "Chunks O' Chicken" and "Chunks O' Turkey," available in 30-oz. institutional size. Light and dark meat are packed in natural juices without the addition of broth and may be used in sandwiches, salads, casseroles, and creamed dishes.

A new instant, nonfat chocolate milk in powder form has been introduced by the *Michigan Milk Producers Association*. Only butterfat and water have been removed, producing a low-calorie product, suitable for use wherever skim milk is recommended. Large powder particles to which water is added dissolve instantly producing a smooth texture with stabilized chocolate solids that do not settle out. It may be used for a hot or cold drink, requires no refrigeration, and will not spoil at room temperatures. It will be packaged in 5-, 25-, and 50-lb. polyethylene-lined bags for the institutional trade.

Since many canned foods are used in recipes, the sizes of cans and jars are important in buying and using these foods. The Consumer Service Division of the *National Canners Association* has prepared a leaflet, "Of Recipes and Can Sizes," supplying this information.

A fat filter, F-60 Fry-Saver, for food establishments that use only one fryer, is being offered by *S. Blickman, Inc.* The Fry-Saver is automatic, works just like a vacuum cleaner. Roll the caster-mounted unit to the fryer, plug it into any standard a.c. outlet, insert the hose in the oil, and flick the switch. The Fry-Saver pulls all the oil out of the fryer, filters it, then pumps pure oil back. Filtering may be done at room temperature. The operator can remove the used fat, flush the fryer, and return the clean fat to the fryer within 5 min. The new unit holds 60 lb. (8 gal.) of fat. A height of 23½ in. makes storage in a small space possible.